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EXPLANATION OF THE PLATES.

Plate.	Fig.	
I.	1.	*Odontolabis Mouhotii*, Parry, ♂.
	2.	,, *Castelnaudi*, Parry, ♂.
II.	1.	,, *Ludekingii*, Vollenh., ♂, var. med.
	2.	,, *Wollastonii*, Parry, ♂.
	3.	,, ,, ♀.
III.	1.	,, ,, ,, ♂, var. max.
	2.	*Sclerostomus signatipennis*, H. Deyr., ♂.
	3.	,, *lineatus*, H. Deyr., ♀.
	4.	,, *fasciatus*, Germain, ♀.
IV.	1.	*Hexarthrius Deyrollei*, Parry, ♂.
	2.	*Cladognathus attenuatus*, Parry, ♂.
	3.	*Neolucanus cingulatus*, Parry, ♀.
	4.	*Cladognathus decipiens*, Parry, ♀.
	5.	,, *zebra*, Oliv., ♀.
V.	1.	*Ægus serratus*, Parry, ♂.
	2.	*Odontolabis Stevensii*, J. Thoms., ♂, var. max.
	3.	*Ægus impressicollis*, Parry, ♂.
	4.	*Mesotopus Tarandus*, Swed., ♀.
	5.	*Odontolabis Stevensii*, J. Thoms., ♀.
VI.	1.	*Cladognathus sericeus*, Hope, ♂, var. max.
	2.	*Lucanus Hopei*, Parry, ♂.
	3.	*Cladognathus fulvonotatus*, Parry, ♂, var. max.
	4.	*Odontolabis Sommeri*, Parry, ♂.
	5.	,, *Brookeanus*, Vollenh., ♂, var. max.
VII.	1.	*Cyclorasis subnitens*, Parry, ♂.
	2.	*Cladognathus Wallacei*, Parry, ♂, var. max.
	3.	,, *bisignatus*, Parry, ♂, var. min.
	4.	*Leptinopterus Fryi*, Parry, ♂, var. max.
	5.	*Cladognathus bisignatus*, Parry, ♀.
	6.	,, *Tragulus*, Vollenh., ♂, var. med.
	7.	*Ægus trilobatus*, Parry, ♂.
	8.	*Leptinopterus rotundatus*, Parry, ♂.
	9.	*Odontolabis æratus*, Hope, ♀.
VIII.	1.	,, *Vollenhovii*, Parry, ♂, var. max.
	2.	*Cladognathus flavidus*, Parry, ♂, var. max.
	3.	,, *elegans*, Parry, ♂.
	4.	,, *quadrinodosus*, Parry, ♂, var. max.
	5.	,, *Lafertei*, Reiche, ♀.

Plate.	Fig.	
IX.	1.	*Neolucanus Baladeva*, Hope, mandib.
	2.	*Rhætus Westwoodii*, Parry, ♂, var. max.; fig. 8, antenna.
	3.	*Neolucanus Saundersii*, Parry, mandib.
	4.	*Cyclorasis Jekelii*, Parry, ♂.
	5.	*Hexarthrius Bowringii*, Parry, ♂, var. max.; fig. 7, antenna.
	6.	*Cantharolethrus Luxerii*, Buquet, ♂.
X.	1.	*Ægus platyodon*, Parry, ♂, var. max.
	2.	*Lucanus Smithii*, Parry, ♂.
	3.	*Chiasognathus Mniszechii*, J. Thoms., ♂.
	4.	*Hemisodorcus Passaloides*, Hope, ♂.
	5.	*Cladognathus politus*, Parry, ♂.
	6.	*Heterochthes brachypterus*, Westw., ♀
	7.	,, ,, ,, ♂.
	8.	*Odontolabis Cingalensis*, Parry, ♂, var. max.
	9.	*Macrocrates bucephalus*, Burm., ♂.
XI.	1.	*Heterochthes brachypterus*, Westw., ♂, var. max.; and details.
	2.	,, ,, ,, ♂, var. min.; and details.
	3.	,, ,, ,, ♀; and details.
	4.	*Cladognathus rudis*, Westw., ♀; and details.
	5.	*Sclerostomus Philippi*, Westw., ♂.
	6.	*Homoderus Mellyi*, Parry, ♂, var. max., anterior part of body.
XII.	1.	*Cladognathus modestus*, Parry, ♂; and details.
	2.	,, *faber*, J. Thoms, ♂, var. max.; 2 *a*, ♂, var. min., head.
	3.	*Buddha*, Hope, ♂, var. max.; 3 *a*, var. min. (*C. Thibeticus*, Westw.)
	4.	*Cyclommatus Maitlandi*, Parry, ♂, var. max.
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	2.	Four cells of hornet's nest.
	3.	A more advanced piece from the same nest.
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	B.	Nest of *Icaria guttatipennis*.
	C.	Comb of *Vespa vulgaris*.
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	2.	,, *Ussherii*, Clark.
	3.	,, *Bowringii*, Clark.
	4.	,, *decorus*, Klug.
	5.	,, *histrio*, Clark.
	6.	,, *vittatus*, Fabr., var.
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	2.	*Limenitis Labotas*, Hewitson.
	3, 4.	,, *Ligyes*, Hewitson.
	5, 6.	*Laogona Lilæa*, Hewitson.

Plate.	Fig.	
XVI.	1.	*Gonepteryx Gobrias*, Hewitson.
	2.	*Eteona Eupolis*, Hewitson.
	3.	*Eueides Eurysaces*, Hewitson.
	4.	*Dircenna Dercyllidas*, Hewitson.
	5.	*Lasiommata Lasus*, Hewitson.
	6, 7.	,, *Leprea*, Hewitson.
XVII.	1, 2.	*Cœnyra Hebe*, Trimen.
	3, 4.	*Xois Sesara*, Hewitson.
	5.	*Yphthima Inica*, Hewitson.
	6, 7.	,, *Nareda*, Kollar.
	8, 9.	,, *Aphnius*, Godart.
	10.	,, *Sepyra*, Hewitson.
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	12.	,, *Pandocus*, Moore.
	13.	,, *Itonia*, Hewitson.
	14, 15.	,, *Ceylonica*, Hewitson.
	16, 17.	,, *Loryma*, Hewitson.
	18.	,, *Sakra*, Moore.
	19.	,, *Narasingha*, Moore.
	20, 21.	,, *Methora*, Hewitson.
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	3.	,, *Bombyx fortunatus*, Hutton.
	4.	,, ,, *Huttoni*, Westw.
	5.	,, ,, *Bengalensis*, Hutton.
	6.	,, *Ocinara lactea*, Hutton.
	7.	,, *Bombyx Mori*, Linn., reverted.
	8.	,, ,, ,, as cultivated.
XX.	1.	*Agra occipitalis*, Bates, ♂.
	2.	,, *tibialis*, Chaudoir, ♀.
	3.	,, *Cytherea*, J. Thoms, ♂.
	4.	,, *Saundersii*, Bates, ♂.
	5.	,, *dominula*, Bates, ♀.
	6.	,, *anguinea*, Bates, ♂.
	7.	,, *Valentina*, Bates, ♀.
XXI.	1.	*Thaumatosoma Duboulaii*, Smith, ♂; 1 *a*, antenna.
	2.	*Tetralonia mirabilis*, Smith, ♂, antenna.
	3.	*Lamprocolletes cladocerus*, Smith, ♂; 3 *a*, 3 *b*, antenna.
	4.	*Ctenocerus ramosus*, Smith, ♂, antenna.
	5.	*Nomia Kirbii*, Smith, ♂, antenna.
	6.	*Psammotherma flabellata*, Smith, antenna.
	7.	*Chalicodoma cœlocera*, Smith, ♂, antenna.
XXII.	1.	*Bombyx Sherwilli*, Moore.
	2.	*Saturnia Cidosa*, Moore.
	3.	,, *Lindia*, Moore.
XXIII.	1.	*Sterrha sacraria*, Linn., ♀, parent of the following.
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	2—7.	*Sterrha sacraria*, varieties bred from eggs laid by fig. 1.
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	2.	,, ,, ,, ♀, ,, ,,

ERRATA.

TRANSACTIONS.

Page 79, line 16 from bottom, insert the habitat "Assam."
,, 207, note, add at the end "at p. 370."

JOURNAL OF PROCEEDINGS.

Page xvi, line 4 from bottom, for "Long. corp." read "Long. cap."
,, xlvii, ,, 20 ,, for "Sybines" read "Sibynes."
,, cii, ,, 17 ,, for "Limenitis" read "Leptosia."

Plates 1, 2, 3, 4, 11 and 12, are erroneously lettered Vol. I. instead of Vol. II.

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1865		Latham, A. G., Weaste Hall, Pendleton, Manchester.
1855		Lea, J. W., B.A., F.G.S., The Grange, Shepperton Green, Chertsey.
1849	†	Lee, John, Q.C., LL.D., F.R.S., &c., Hartwell House, Aylesbury.
1859		Lewis, Rev. Evan, B.A., Rothwell, Northamptonshire.
1865		Lier, H. H. H. van de, Delft.
1865	S.	Lighton, Rev. Sir C. R., Bart., Ellastane, Ashbourne.
1835	†	Lingwood, R.M., M.A., F.L.S., 1, Derby Villas, Cheltenham.
1865		Linnell, John, jun. Redstone, Redhill.
1865	†	Llewelyn, J. T. D., M.A., F.L.S., Ynisygerwn, Neath.
1851		Lodder, Major H.C., 47th Infantry, Toronto, Canada West.
1849		Logan, R.F., Hawthornbrae, Duddingstone, near Edinburgh.
1850	S.	Lowe, W. F., M.D., Balgreen, Slateford, near Edinburgh.
1850	†	Lubbock, Sir John, Bart., F.R.S., F.L.S., F.Z.S., &c., *President*, High Elms, Farnborough.
1865	S.	Lyddeker, Richard, Harpenden Lodge, St. Albans.
1865		M'Caul, S., B.C.L., Rectory House, London Bridge, E.C.
1851	†	M'Intosh, J., Matfen Hall, Newcastle-upon-Tyne.
1858		M'Lachlan, Robert, F.L.S., 1, Park Road Terrace, Forest Hill, S.E.
1865		Marshall, Rev. T. A., M.A., The College, Milford Haven.
1856	†	Marshall, William, Elm Lodge, Clay Hill, Enfield.
1865		Mathew, G. F., R.N., F.L.S., Raleigh House, Barnstaple.
1860		May, J. W., 9, Victoria Road, Finchley Road, N.W.
1865	S.	Meek, Edward, 5, King Street, Old Ford Road, N.E.
1865		Mercer, Albert, 24, Hemingford Road, Islington, N.
1864		Milnes, Rev. Herbert, Crich, Matlock.

Date of Election.		
1853		Moore, Frederic, 16, Rochester Terrace, Kentish Town Road, N.W.
1859		Mosse, G. Staley, 12, Eldon Road, Kensington, W.
1861		Murray, Andrew, F.L.S., 67, Bedford Gardens, Kensington, W.
1849	†	Newman, Edward, F.L.S., F.Z.S., M. Imp. L. C. Acad., 7, York Grove, Queen's Road, Peckham, S.E.
1841	†	Owen, Richard, M.D., LL.D., F.R.S., F.L.S., F.G.S., British Museum, W.C.
1863	S.	Parfitt, Edward, Devon and Exeter Institution, Exeter.
1840	†	Parry, Major F. J. Sidney, F.L.S., 18, Onslow Square, S.W.
1865		Parry, Thomas, The Bank, Merthyr.
1854		Pascoe, Francis P., F.L.S., 7, Palace Garden Villas, Kensington, W.
1860	S.	Pelerin, W. G., 237, Queen's Road, Dalston, N.E.
1862	S.	Phillipps, William, Reigate Lodge, Reigate.
1852	†	Pickersgill, J. C., Hooley House, Coulsdon, Croydon, S.
1851		Preston, Rev. T. A., M.A., The College, Marlborough.
1866	S.	Pryer, W. B., Shanghai.
1865	S.	Ransome, Robert James, Ipswich.
1865		Reeks, Henry, The Manor House, Thruxton, Andover.
1857	S.	Robinson, E. W., 43, Harmood Street, Kentish Town, N.W.
1866		Rogers, C. O., St. George's Terrace, Lower Clapton, N.E.
1865	S.	Rogers, W., Grove Cottage, Merton Road, Lower Tooting, S.
1865		Rooke, Col. Willoughby S., F.L.S., Guards Club, Pall Mall, S.W.
1861	S.	Ruspini, F. O., 2, Havelock Villas, Pendleton, Manchester.
1865		Rylands, T. G., F.L.S., F.G.S., Heath House, Warrington.
1865	†	Saunders, Edward, Hill Field, Reigate.
1861	†	Saunders, G. S., Hill Field, Reigate.
1849	S.	Saunders, S. S., H.M. Consul-General, Corfu.
1849	S.	Saunders, W. F., F.L.S., Hill Field, Reigate.
*	†	Saunders, W. W., F.R.S., F.L.S., &c., Hill Field, Reigate.
1865		Schaufuss, L. W., M. Imp. L. C. Acad., &c., Dresden.
1865		Scholfield, R.S., Junior Carlton Club, Waterloo Place, S.W.
1857		Sealy, A. F., M.A., India.
1864		Semper, Georg. Altona.
1862		Sharp, David, 12, St. Vincent St., Edinburgh.
1847		Shepherd, Edwin, *Secretary*, 176, Fleet Street, E.C.
1851		Sheppard, Augustus F., Rose Bank, Eltham Road, Lee, S.E.
1852		Sheppard, Edward, F.L.S., 18, Durham Villas, Kensington, W.
1865		Sichel, Dr. Jules, 50, Rue de la Chaussée d'Antin, Paris.
1853		Signoret, Victor, 51, Rue de Seine, Paris.
1863		Smith, E. A., 27, Richmond Crescent, Islington, N.
1850		Smith, Frederick, 27, Richmond Crescent, Islington, N.
*	†	Spence, W. B.
1848	†	Stainton, H. T., F.L.S., F.G.S., Mountsfield, Lewisham, S.E.
1862		Stevens, John S., 24, Bloomsbury Street, W.C.
1837		Stevens, Samuel, F.L.S., *Treasurer*, 24, Bloomsbury Street, W.C.
1854	S.	Thompson, Miss Sophia, Barn Hill, Stamford.
1850	S.	Thompson, Thomas, Hull.

Date of Election.		
1856		Thomson, James, 23, Rue de l'Université, Paris.
1838		Thwaites, G. H. K., Ph. D., F.R.S., F.L.S., Ceylon.
1859		Timins, Rev. Douglas C., M.A., Avonholme, Tunbridge Wells.
1853	S.	Tompkins, H., 44, Guildford Street, Russell Square, W.C.
1859		Trimen, Roland, Colonial Office, Cape Town.
1854	S.	Turner, J. A., Pendlebury House, Manchester.
1849		Vaughan, P. H., Redland, near Bristol.
1854		Wailes, George, Burghfield Grange, Gateshead.
1862		Walcott, W. H. L., 11, Vyvyan Terrace, Clifton, Bristol.
1850		Walker, Francis, F.L.S., The Avenue, Church End, Finchley, N.
1858		Wallace, Alexander, M.D., Beverley House, Colchester.
1863		Wallace, Alfred R., F.Z.S. F.R.G.S., 9, St. Mark's Crescent, Regent's Park, N.W.
1850	S.	Ward, S. Neville, F.L.S., Coimbatore, Madras.
1850		Waring, S. L., The Oaks, Norwood, S.
*		Waterhouse, G. R., V.P.Z.S., &c., British Museum, W.C.
1845		Weir, J. Jenner, F.L.S., 6, Haddo Villas, Blackheath, S.E.
1855		Were, R. B., 35, Osborne Terrace, Clapham Road, S.
*		Westwood, Professor J. O., M.A., F.L.S., &c., Oxford.
1865		White, Rev. W. Farren, Stonehouse Vicarage, Gloucestershire.
1849		Wilkinson, S. J., 7, Jeffrey's Square, St. Mary Axe, E.C.
1863		Wix, William, Isbells, Reigate.
1843		Wollaston, T. Vernon, M.A., F.L.S., 1, Barnepark Terrace, Teignmouth, Devon.
1865	S.	Wood, H. T., The Vicarage, Harrow, N.W.
1862		Wormald, Percy C., 6, Brondesbury Terrace, Kilburn, N.W.
1866		Wright, E. Perceval, M.A., M.D., F.L.S., &c., 10, Clare Street, Dublin.
1865	S.	Young, Morris, 7, Old Sneddon Street, Paisley.

TRANSACTIONS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON.

I. *A Catalogue of* Lucanoid Coleoptera; *with Illustrations and Descriptions of various new and interesting Species.* By Major F. J. Sidney Parry, F.L.S.

[Read 7th Sept. 1863, 4th Jan., 4th April, 1864.]

That portion of Coleoptera known to Entomologists as the *Pectinicornia*, and established as such by Dr. Burmeister and Professor Lacordaire, may be formed into two separate divisions, viz. *Lucanoidea* and *Passaloidea*. The want of sufficient material prevents me from submitting any satisfactory observations on the latter division; and I must refer the reader in respect to it to the Monograph of M. Percheron, as also to the several publications of Dr. Burmeister, the Rev. F. W. Hope, Professor Lacordaire, and other Entomologists. I may remark, however, that this division appears to be far from a happy one, confusion and disorganization reigning to a great extent.

The numerous new species of exotic Coleoptera that have of late years enriched our collections, resulting from the indefatigable labours of those enterprising travellers, the late lamented Madame Pfeiffer, Count de Castelnau, Messrs. Wallace, Fortune and Bates, the late M. Mouhot and M. Henri Deyrolle, have enabled us to add considerably to our knowledge of this branch of natural history. Descriptions and figures of many new and interesting

species by several well known Entomologists have from time to time appeared in the Transactions of the Entomological Societies of London and of France, and among the descriptions alluded to I am happy to say that the interesting group of the *Pectinicornia* has not been neglected. Mr. Wilson Saunders has published, with plates, in the 3rd volume of the second series of our Transactions, the characters of several new and rare species from China, collected by Mr. Fortune in his travels through the tea districts of that country, previously unexplored in an entomological point of view; my friend Professor Westwood, in the same volume, as well as in subsequent publications of our Society, has also given some excellent figures and descriptions of numerous new and rare species; and I myself have also had the pleasure of recently submitting to the Society descriptions of several interesting novelties. This considerable increase during the last few years to our Lucanoid Coleoptera, coming chiefly from India, China and the Eastern and Australian Archipelagos, as well as the addition to our collections of various other species heretofore considered of extreme rarity, or known only by indifferent descriptions or still more indifferent figures, has enabled the Entomologist to clear up many points with reference to the identity and localities of the *Lucanoidea*, and has further given him the opportunity of forming a more just and comprehensive view respecting the very important point of species and variety.

Great confusion has hitherto existed in the synonymy and nomenclature of the different families; with the view, therefore, to its rectification, a newly revised catalogue would, I feel, prove not unacceptable; and by the encouragement and assistance received from many entomological friends, I have been induced to undertake the present publication. I cannot refrain, whilst upon this point, from expressing my best thanks, especially to Count Mniszech, James Thomson, Esq., Dr. Gray, Professor Westwood, W. Wilson Saunders, Esq., A. R. Wallace, Esq., A. Fry, Esq., and J. C. Bowring, Esq., for having most kindly placed at my disposal the various species required for examination.

It would be superfluous here to enumerate all those Entomologists, who, either by their descriptions of new genera or of species, have contributed to our knowledge of this interesting group; such descriptions, with the names of the respective authors, will be duly notified in their places in the catalogue. But I think it desirable to allude to those distinguished authors who have more particularly and so conspicuously, by their several publications, advanced our knowledge, with reference more

especially to its classification and general arrangement; their names, already familiar to the Entomologist, are as follow:—

Latreille (Cuvier, Règne Animal, iv. 576).

M'Leay (Horæ Entomologicæ, i. 195).

Westwood (Ann. Sci. Nat. Ser. 2, i. 112 (1834); Modern Classification of Insects, i. 185; Trans. Ent. Soc. Lond. iv. 271; N. S. iii. 197).

Hope (Catalogue of Lucanoid Coleoptera, 1845).

Burmeister (Handbuch der Entomologie, v. 305, 1847).

Lacordaire (Genera des Coleoptères, iii. 1).

Brullé (Hist. Nat. des Insectes, tom. 3).

Leconte (Classification of Coleoptera of North America (Smithsonian Instit.), p. 120).

The most important collections of the species of this division are to be found in the cabinets of Count Mniszech and Mr. Thomson at Paris (the latter especially interesting as including the species from the collections of Count Dejean, M. Laferté and M. Reiche), in the British Museum, and in the cabinets of the late Rev. F. W. Hope (so liberally presented to the University of Oxford) and Mr. W. W. Saunders; and, lastly, in my own collection, which contains, I believe, the largest number of species ever brought together.

With reference to the respective families it is not my intention to propose any very great change in the classification; nevertheless I feel that much in this respect is still required, but it appears to me that the period for such re-organization has not yet arrived, a greater knowledge of species being absolutely requisite for undertaking such a task. Should our collections continue to be enriched as they have been of recent years, this desirable object might then be successfully undertaken, for I am convinced that it is only by placing before the eye a sufficient series of the insect to be described (and this is more especially true of the Lucanoid Coleoptera) that a just appreciation of its general form and character can be arrived at. It is vain to expect to ascertain the true characters of a genus until the species shall themselves have been properly established; and the development of species so peculiar in the Lucanoid Coleoptera has but too often given rise to great confusion, specimens having not unfrequently been mistaken by Entomologists as the types of distinct species, and described as such, when in fact they were but varieties of species previously known. As already stated, this, my tribute to the Society, must be considered simply as a rectified catalogue, including notices, descriptions and figures of various new and interesting species:

as such I trust it may prove useful. Those Entomologists who wish more particularly to study the sectional characters of the various genera and sub-genera must consult the authors previously alluded to. The general arrangement I have adopted has been based chiefly upon the publications of the Rev. F. W. Hope, Dr. Burmeister, Professors Westwood and Lacordaire, combined with certain alterations which it seemed to me convenient to introduce; but as great difference of opinion exists upon this point, the grouping of the various families can scarcely be yet regarded as definitively settled.

Professor Westwood, in his remarks on the sectional characters of the Lucanoid Coleoptera (Trans. Ent. Soc. Lond. iv. 273), says, "the number of joints in the club of the antennæ at first suggested itself, and indeed it had been already proposed by M'Leay, as a primary sectional character; but this, in addition to the difficulty of its employment, owing to the greater or less development of the joint preceding the clava, was shown to be inefficient, by separating species which agreed together in their entire habitus." And I may upon this point further remark, that not only this funiculus, but even the very joints of the clava, are variable; instances occurring (especially in the well-known European species *Lucanus cervus*) where, in the same individual, the clava is found to be both four and five-jointed.

Professor Westwood then refers to the tibial spines as bringing together in the most natural manner the great majority of the species, stating that by the employment of this character the genus *Lucanus* may be divided into three great groups—

1. Those species with two or three spines on the outside of the posterior and intermediate tibiæ; this group comprises some of the largest species of the family.
2. Those with only one spine in the middle of the four posterior tibiæ in both sexes; comprising the gigantic species of *Dorcus* from the eastern hemisphere, as well as the small typical *Dorci* of moderate climes, and the group of *Ægus*, of which no Entomologist has been able to establish sufficient characters to separate it from other sections of the *Lucanidæ*.
3. An extensive group of species which either possess no spines on the four posterior tibiæ, or have one small spine developed in the middle of those tibiæ in the ♀ only.

This character again is, I think, very unsatisfactory, these spines being often found very aberrant, and, like the claval joints of the antennæ, not always to be relied upon; an arrangement

based upon it is equally at variance with the natural grouping of species; for we occasionally find individuals of the same species both with and without their proper complement of spines. Where two species in every respect assimilate to each other except in regard to the spines on the tibiæ, the absence or presence of these ought not, I think, to separate them.

There are two very remarkable characters of this group hitherto but slightly noticed by Entomologists, which, although not available for the purpose of generical or sectional division, are yet, for the purpose of specific determination, of very great interest. I refer to the development of the mandibles and to the punctuation. The extraordinary difference in the development of the mandibles is not easily to be accounted for; under what circumstances the larger insect is provided with small undeveloped mandibles, and a smaller specimen of the same species with those organs fully developed, must always remain a mystery. But of this I feel certain, that the whole character of numerous species varies (with reference to their punctuation) in accordance with the development of the mandibles. When these have obtained their full growth the sculpture of the species has entirely changed, and in fact frequently disappears altogether; and when the development is but small or moderate the sculpture becomes more definite, often resembling that of the females, in which it is almost invariably stronger; in fact, these small undeveloped males approximate so closely to their females that I could name well-known Entomologists who have been even led into the error of describing them as such. Is it possible that these small males may be found upon closer anatomical examination to be neuters? It is a point of great interest, and well worthy of deeper investigation.

With these facts before me, I have been much perplexed, and have, therefore, abstained for the present from suggesting any decided characters of those new sections. I feel the necessity of such characters being pointed out, but on this occasion my aim is only to present the student with a revised catalogue of the various species, and although errors will doubtless occur, still I trust that my labour may not prove altogether in vain.

Descriptions of New, and Notes on some of the rarer, Species.

The descriptions of some of the species hereafter mentioned have already been published in the "Proceedings of the Entomological Society" for December, 1862, with a view to their incorporation in the present catalogue; to these are joined others of new and rare species, of which several have been lately added to

our collections, and most of these are illustrated by figures. Having lately returned from visiting the several collections at Leyden, Amsterdam, Halle, Berlin, Stettin and Paris, I have ascertained some interesting points with reference to the synonymy of certain species, and have acquired the knowledge of others previously unknown to me. I take this opportunity of thanking the gentlemen connected with the museums already alluded to for the great kindness and courtesy they respectively evinced towards me when visiting the collections placed under their charge.

Chiasognathus Latreillei ♀, Solier.
Reichii ♂, Thomson.
imberbis, Dohrn, MS.

I have no doubt as to the identity of the above (already referred to in my Remarks on Mr. Thomson's Catalogue of *Lucanidæ*, Tr. Ent. Soc. 3rd Series, vol. i. p. 444). Although my collection does not contain this species, I have been able to examine specimens of it in the collections of Count Mniszech and Herr Dohrn, at the Jardin des Plantes (Solier's type) and the Leyden Museum; all of which accord so entirely with the excellent figure in my possession by M. Migneaux, that I have now no hesitation in uniting them.

Chiasognathus Mniszechii ♂, Thomson. (Pl. X. fig. 3.)
? *Jousselinii*, Reiche.

Of the identity (although very probable) of these species I am not quite so certain. Single specimens of *C. Mniszechii* are in the collections of Mr. Thomson, Count Mniszech and M. Germain; the unique type specimen of *C. Jousselinii* is in the collection of M. Jousselin at Versailles. According to a recent communication from M. Reiche, the two are to be considered as distinct.

Cantharolethrus Luxerii ♂, Buquet. (Pl. IX. fig. 6.)

Whether this unique species is to be placed with the *Chiasognathidæ* or the *Lucanidæ* is problematical; both Mr. Thomson and Count Mniszech have considered it as belonging to the latter family; the ♀ being as yet unknown, it is difficult to assign its true position. The second species mentioned by Mr. Thomson in his Catalogue, *C. Reichii* ♀, was originally described by the Rev. F. W. Hope (Trans. Ent. Soc., vol. iv. p. 182, pl. xiii. fig. 3), and placed with *Pholidotus;* the two species may possibly hereafter prove identical.

LAMPRIMA SUMPTUOSA ♂, Hope, Cat. p. 28.

L. supra tota flammeo-rufescens, punctata; mandibulis valde curvatis, apice nigris, elevatis et auriculatis; sterni processu apice nigro et suboblique truncato; elytris irregulariter substriolatis; tibiis anticis extus 6 vel 7-spinosis; calcare gracili, cultriformi; pedibus 4 posticis gracilibus, tibiis in medio bidentatis; corpore infra cupreo et æneo, nitidissimo.

Long. corp. (mandib. inclus.) lin. 9.

Hab. Swan River.

A good species belonging to the second section of *Lamprima*. A single specimen only in the Hopeian collection at Oxford.

Gen. COLOPHON, Westw. Ann. Sc. Nat. i., ser. 2, p. 113.

The general form of the species of this genus exhibits such a remarkable difference from the insects pertaining to the family *Dorcidæ*, in which it has been hitherto located, that after a careful comparison with various genera, more especially with *Lamprima* and *Streptocerus* (to which the only two species of the genus *Colophon*, viz. *C. Westwoodii* and *C. Thunbergii*, in the form of the prothorax and of the head as well as in the structure of the mandibles, bear, I think, a somewhat striking resemblance), I have been induced to place it in the same family, *Chiasognathidæ*, of which it may be regarded as the African representative. I place it in juxtaposition with *Streptocerus*, which it further resembles in possessing four joints to the clava of the antennæ, and thus affords a connecting link with the *Lucanidæ*.

MESOTOPUS TARANDUS ♀. (Pl. V. fig. 4.)

Lucanus Tarandus ♂, Swed. in Act. Holm. 1787, iii. 186, tab. viii. fig. 2.

M. ebenina nigra, nitidissima; capite subrugoso-punctato, antice excavato, bispinoso, postice lævi, politissimo; mandibulis brevibus, trigonis, intus bidentatis; elytris subovalibus; tibiis extus ut in maribus 3-dentatis.

Long. corp. (mandib. incl.) unc. 1, lin. 6.

Hab. Afric. Occ.

The female, now for the first time figured, has hitherto been of extreme rarity. The only specimens of that sex with which I am acquainted are in the cabinets of the late Rev. F. W. Hope, Count Mniszech and my own.

Lucanus cervus, Linnæus.

The earliest figure representing this species with which I am acquainted is to be met with in Gesner's History of Foor-footed Beasts, Serpents and Insects, published by Edward Topsel, in London, 1658. The description is so quaint that I have deemed it not uninteresting to republish it *in extenso*.

"Beetles are some greater, some less, the great ones some have horns, others without horns. Those that have horns some are like Hartshorns, other have Buls horns, some have horns in their noses: we shall speak of them all in order. The Ηλατυκερως, or Hartshorn beetle, is called Lucanus by Nigidius; as Pliny witnesseth. Some call it the Bull, others the Flying Stag: Hesychius cals it ακανθος, because it lays hold on things in its way with thorny horns. Cardanus calls it σκαραβελαφος, a word composed of Greek and Latin; Gaza calls it καραβος; the Italians call it Cereti, and vulgarly Polupeso; the French, Cerf volant; the English, Stag fly or Flying fly; the Hollander, Fliegende Hert; the Illyrians, Gelui; the Poles and Sclavonians, Krowha Wielk.

"Amongst all the horned beetles for the shape of its body, length and magnitude, it may challenge the first place, and is the most noted. It is blackish, of a dark red, especially about the outward cover and the breast; it hath two whole horns without joynts, and with branches like a stag as long as ones little finger in such as are grown up, but they are less and shorter in the young ones, (or as Pliny saith) it has long and moveable horns nicked with cloven pincers, and when it will, can bite or nip with them, for it will close them wonderfully, and useth its horns for that end for which crabs and lobsters do their claws; the eyes are hard putting forth and whitish, it hath foreyards on both sides of them, one pair that are branched between the horns and eyes, the joynt whereof makes almost a right angle, and two more breaking forth in the midst of the forehead straight and plain, ending as it were in a little smooth knot.

"It goes upon six feet; the fore feet are longer and greater than the rest. Lonicerus makes this to be the male; but I (if there be any distinction between the male and the female) shall no doubt to call it the female: both because the other kindes of beetles are less (for, as Aristotle observes, the males in insects are far less than the females), an also in copulation the females receive from the lesser as experience confirms it. The male is altogether like it, but is less both for body and in horns: which

though they be not branched on both sides; yet pressed together they do more sharply prick ones finger than the female doth."

In the Berlin Museum, I lately saw a most interesting variety of this species, the right mandible and the right fore tibia being those of a ♀, the remainder of the insect exhibiting the usual appearance of the ♂; such an interesting specimen of a hermaphrodite insect is seldom to be met with. In the same rich collection I also saw the type specimen of *Lucanus armiger*, Herbst, tab. 34, fig. 1 (var. *cervus*), the mandibles of which show a very singular case of malformation.

With regard to the various modifications of form exhibited by *L. cervus* and other allied species of Europe and Asia Minor, see Dr. Kraatz's paper, with figures, in the Berlin Entom. Zeitsch. 1860.

LUCANUS LATICORNIS ♂, H. Deyrolle, MS.

A description of this new species from Asia Minor will be published during the ensuing year by M. Henri Deyrolle in the Ann. Soc. Ent. de France; it is allied to *L. orientalis* of Kraatz, differing, however, in having the 6-jointed clava of the antennæ strongly developed, and the mandibles considerably more slender.

LUCANUS HOPEI ♂, Parry (♀ ignota). (Pl. VI. fig. 2.)

L. nigro-brunneus, politus; mandibulis elongatis, intus quinquedentatis; capite supra singulariter coronato, lobato; femoribus subtus striâ longâ latiusculâ fulvo-notatis, in pedibus anticis fere obsoletâ; tibiis anticis et intermediis irregulariter 4 aut 5 denticulatis, posticis 3-dentatis.

Long. corp. fere unc. 2; mandib. unc. 1.

Hab. Ind. Or., aut Archipel. Malay. Coll. Parry.

Head wider than the thorax, both of a brownish-black colour. Clypeus of a long triangular form, placed nearly perpendicularly. Fore margin of the crown of the head with a singular elevated process, forming two great lobes, separated by an arcuate line. The mandibles are strong and bent somewhat downwards, armed interiorily with five teeth, the one near the tip forming with it a fork; the largest, near the base, blunt and nodose at the tip; the three others equidistant between the centre and apex. Prothorax longitudinally impressed down the centre; the punctuation of the head and prothorax not very strong. The elytra smooth and polished. The antennæ of this fine species are unfortunately wanting, but I have little doubt of the insect being a true *Lucanus*. I have named it in memory of a gentleman whose services rendered to Entomology stand preeminent.

Lucanus Smithii ♂, Parry (♀ ignota). (Pl. X. fig. 2.)

L. nigro-fuscus, subtus dense villosus; elytris rufo-ferrugineis, nitidis, villosulis; mandibulis apicibus furcatis, intus ante medium lobo tridentato armatis.

Long. corp. unc. 1, lin. 7.

Hab. Ind. Sept. Coll. Parry.

Allied to *L. villosus*, Hope. Mandibles subquadrate, outer margin sinuate; beyond the middle a tridentate lobe; the tip of each mandible furcate. Clypeus triangular, slightly excavated. Base of mandibles, head, thorax and elytra (when in good condition) with short scattered hairs. Head with ridges and crest much as in *L. villosus*, but the lateral ridges not so elevated. Femora and tibiæ with a ferruginous vitta, widely separated, the posterior with two teeth. I have dedicated this new species to F. Smith, Esq., the well-known Hymenopterist, and President of the Entomological Society.

Lucanus maculifemoratus, Motschulsky, Etudes Ent. 1861.
? *sericans* (De Haan, MS.), Voll. Tijd. v. Ent. iv. 103.

Specimens of this new and rare species from Japan are in the museums of Leyden and the Zool. Soc. Amsterdam, ♂, ♀, and in the collections of Count Mniszech and myself. The habitat Java, ascribed to *L. sericans* by M. van Vollenhoven, appears to be erroneous; the latter insect is probably the var. minor of *Lucanus maculifemoratus*.

With reference to *Lucanus Hircus*, Sturm, Cat. (Java), I have not been able to obtain any information.

Gen. Rhætus, Parry (gen. nov.).

Caput transversum, angustum, antice depressum. Mandibulæ falcatæ, maximæ, ad basin fortiter dilatatæ. Antennæ clava mediocri quadri-articulata. Prothorax lateribus in medio armatis. Corpus elongatum, subparallelum. Tibiæ posticæ inermes.

Hexarthrio affine genus. Nomen a gigante Rhæto, uno e Titanis, derivatum.

The principal distinctive characters above given of this genus present an interesting connecting link between *Lucanus* and *Hexarthrius;* on the one hand, the moderately developed clava of its antennæ, the flat and generally depressed form of its head, and its unarmed posterior tibiæ, separate it from *Lucanus;* whilst on the other hand it is distinguished from *Hexarthrius* by the 4-jointed clavæ of the antennæ, and its laterally-armed prothorax.

Rhætus Westwoodii ♂, Parry (var. max., ♀ ignota). (Pl. IX. figs. 2 & 8.)

Hexarthrius (?) *Westwoodii*, Parry, Proc. Ent. Soc. 1862, p. 108.

R. nigerrimus, nitidus, sublente tenuissime granulosus; mandibulis elongatis, falcatis, apicem versus parum deflexis, singulariter ad basin excavatis et supra infraque dente magno armatis, ante medium dente acuto instructis, apicibus furcatis; capite brevissimo, prothorace angustiori, clypeo transverso haud prominulo, concavo, antice in medio angulato; prothorace transverso, lateribus sinuatis dente parvo acuto armatis; elytris elongatis, subparallelis; tibiis anticis 4 aut 5-spinosis, intermediis extus in medio dente acuto armatis, posticis simplicibus.

Long. corp. unc. 2, lin. 3; mandib. unc. 1, lin. 3.

Hab. Ind. Or., aut Archip. Ind.(?)

I am indebted to J. C. Bowring, Esq., for the possession of this magnificent and unique species. It is one of the largest of the Lucanoid Coleoptera, measuring $3\frac{1}{2}$ inches.

Hexarthrius Deyrollei ♂, Parry (var. max., ♀ ignota). (Pl. IV. fig. 1.)

H. niger; mandibulis exsertis, supra et intus denticulatis, ad basin singulariter excavatis; capite supra bituberculato; elytris plagâ posticâ castaneâ.

Long. corp. fere unc. 2; mandib. lin. 9.

Hab. Siam. Specimen unicum in Coll. Mniszech.

Closely allied to *H. Parryi*, Hope, but of a more elongate and slender form. Mandibles straighter, with the interior portion of their base deeply excavated. The binodose elevations on the head of *H. Parryi* are replaced by two elevated conical tubercles. The prothorax is narrower and longer, with the anterior tubercular angle more prominent. The apical yellow plaga of the elytra does not extend so far towards the base; and the punctuation of the mandibles, head and prothorax is infinitely stronger; the legs are more slender.

I am indebted to M. Henri Deyrolle for the characters of this species, at present unique in the museum of Count Mniszech, and received from Count de Castelnau.

Hexarthrius Chaudoirii, H. Deyrolle, MS.

This new species from Sumatra, allied to *H. Rhinoceros*, is in the collection of Count Mniszech. M. Henri Deyrolle proposes to describe it in the Ann. Soc. Ent. Fr. for 1864.

Hexarthrius Bowringii ♂, Parry (var. max., ♀ ignota).
(Pl. IX. figs. 5 & 7.)

H. nigro-fuscus, nitidus; antennarum clava 6-articulata, mandibulis apice subrecurvis, intus 3-dentatis, dente 1o et 2do pone medium, tertio ad basin subfurcato; tibiis anticis serratis, intermediis unidentatis, posticis simplicibus.

Long. corp. unc. 2; mandib. lin. 9.

Hab. Ind. Or.

Black. Elytra of a polished ferruginous brown. Mandibles somewhat flattened, more especially at the base, strongly punctured; tips acute and bending upwards; a sharp prominent tooth behind the tip, succeeded by a smaller one, and at the base a broad obtusely bifid and slightly elevated process. Head closely punctured, with the hind margin highly polished, and two small round anterior depressions on the vertex, very slightly emarginate; clypeus small, deflexed and triangular. The prothorax is about the width of the body; like the head closely punctured, with a slightly impressed central line; the posterior angles slightly emarginate. Elytra polished, ferruginous brown, darkest on the suture and at the sides. Legs ferruginous, margined and varied with black. Tarsi black; anterior tibiæ serrated externally with three or four small irregularly disposed spines, the apical tooth very prominent and much curved.

Gen. Odontolabis, Hope.
Anoplocnemus, Id.

The genus *Anoplocnemus*, Hope (vid. Tr. Ent. Soc. iii. 279), was founded on and included only a single species, viz., *A. Burmeisteri* (Hope, Cat. pp. 5 and 16), a gigantic species from the Mysore district, Northern India, at present in the Hopeian Coll. at Oxford (and which may possibly hereafter prove to be only an extreme variety of *Odontolabis Cuvera*). The principal character assigned to the genus is the absence of spines from all the tibiæ. As in every other respect there is nothing to distinguish it from the ordinary form and character of the several species belonging to *Odontolabis*, which, when fully developed, have almost invariably their fore tibiæ unarmed, I have incorporated *Anoplocnemus* with *Odontolabis*, of which genus numerous species have lately been added to our collections.

I am at a loss to imagine why Dr. Burmeister preferred establishing *Anoplocnemus* as a genus in preference to *Odontolabis*, Mr. Hope having notified only one species of the former to fourteen of the latter.

ODONTOLABIS VOLLENHOVII ♂, Parry (var. max., ♀ ignota). (Pl. VIII. fig. 1.)

Lacordairei, Id., MS. olim.

O. atro-fuscus; elytris lævissimis, flavis, anguste nigro-marginatis, sutura latius nigra; capite magno, lateribus supra densissime rugosis, margine antice reflexo emarginato, plagâ magnâ rufâ notato, mandibulis capite fere duplo longioribus, rugoso-punctatis, apicibus furcatis interne denticulatis, et dente forti ante medium instructis; tibiis anticis in medio obsolete unidentatis, posticis quatuor inermibus.

Long. corp. (mandib. incl.) unc. 2, lin. 9.

Hab. Borneo. Specimen unicum in Coll. Parry.

I had originally named the above species after my distinguished friend Professor Lacordaire, whose reputation as an Entomologist is so universal that I need scarcely allude to it. M. Snellen van Vollenhoven, having received from Sumatra a closely-allied species, and being under the impression that it was identical with the above, courteously retained my MS. name in his description of the Sumatran species (vid. Tijd. v. Ent. iv. 104, tab. v. fig. 1.)

The two are, however, totally distinct, and I have great pleasure in dedicating this fine species to a gentleman who has rendered such important services to science as Director of the museum of Leyden, and to whom I feel grateful for his kind attention when recently there.

O. Vollenhovii has the facies of the preceding genus *Hexarthrius*, forming the connecting link between the two genera. It differs from *O. Lacordairei* in the following particulars—the mandibles are more robust, more convex, and more strongly punctuated; the head is in proportion larger, with the anterior elevated margin slightly sinuated in the centre, and the angle behind the eye is more obtuse; but the principal difference is to be found in the prothorax, which is considerably narrower, with the sides rectangular instead of being dilated, and the posterior angles strongly emarginate; the body is also somewhat shorter.

ODONTOLABIS LUDEKINGII, Voll. (Pl. II. fig. 1.)

Lucanus Ludekingii, Voll. Tijd. v. Ent. iv. 104, tab. v. f. 2.

O. ater; capite latissimo, in lateribus punctatissimo, fronte transversim carinata; elytris lævissimis testaceis, sutura latius et limbo externo anguste nigris.

Long. corp. (mandib. incl.) 2½ unc.

Hab. Sumatra. Coll. Mus. Lugdun., de Castelnau, Mniszech et Parry.

Odontolabis Wollastonii, Parry. (Pl. II. figs. 2 & 3, ♂, ♀ ; Pl. III. fig. 1, var. max.)

O. niger; capite margine antico fortiter emarginato, fronte depresso pone oculos exciso, spino acuto armato ; mandibulis (var. minor) capite brevioribus, intus fortiter et irregulariter dentatis ; prothorace angusto, lateribus fere parallelis, pone medium spina magna acuta armatis, angulis posticis acutis; elytris aurantiacis, limbo externo tenuissime nigro-marginato, plagâ magnâ triangulari nigrâ literam V formante a basi fere ad apicem descendente ; tibiis anticis extus trispinosis, quatuor posticis inermibus.

Long. corp. (mandib. incl.) unc. 2.

Hab. Malacca. Coll. de Castelnau, Mniszech et Parry.

Another rare species from the Malay peninsula, recently discovered by Count de Castelnau, allied to *O. Ludekingii*, but abundantly distinct ; the head is smaller and less coarsely punctured, whilst the body, of a deeper orange colour, is marked by a large black plaga, extending from the base to near the apex ; whereas in *O. Ludekingii* there exists only a broad sutural black line. I have dedicated it to my friend T. V. Wollaston, Esq., the well-known author of "Insecta Maderensia."

Odontolabis Mouhotii ♂, Parry (var. med., ♀ ignota). (Pl. I. fig. 1.)

O. niger, nitidus ; capite magno antice emarginato, angulis anticis rotundatis, lateribus pone oculos spino acuto instructis; mandibulis brevibus, intus irregulariter et fortiter dentatis ; prothorace transverso, angulis anticis rotundatis, posticis acutis, lateribus pone medium spina acuta armatis ; elytris lævissimis, aurantiacis, basi prope scutellum suturaque anguste nigris ; tibiis anticis 5-spinosis, quatuor posticis inermibus.

Long. corp. unc. 2 ; mandib. lin. 6.

Hab. Cambodia, Siam. Specimen unicum in Coll. Castelnau.

This species is dedicated to the memory of the late M. Mouhot, to whom we are indebted for many new and rare species from the same locality : whilst attempting to explore the unhealthy districts of Cochin China he fell a victim to the climate.

Odontolabis Castelnaudi ♂, Parry (♀ ignota). (Pl. I. fig. 2.)

O. giganteus, niger, glaberrimus ; mandibulis capite parum longioribus, valde exsertis, interne ad basin dente magno obtuso armatis, et ante basin apicem versus plurimis denticulis

nodosis irregulariter instructis, apicibus subfurcatis; capite magno, antice depresso, margine subelevato, angulis anticis oblique rotundatis, et infra oculos spina magna obtusa instructo; prothorace transverso, capite latiori, lateribus antice obliquis, angulis posticis emarginatis; elytris subovalibus, brunneo-testaceis, lævissimis, latitudine prothoracis, marginibus externe suturaque tenuiter nigris; tibiis anticis curvatis, et prope apicem spina minuta armatis, quatuor posticis inermibus.

Long. corp. unc. 2, lin. 5; mandib. lin. 9.

Hab. Sumatra. Coll. Castelnau.

For the opportunity of placing this magnificent new species of *Odontolabis*, as well as the three preceding, in the present publication, I am indebted to Count Mniszech, who, through the kindness of Count de Castelnau, was enabled to obtain the accompanying faithful figures, executed by M. Migneaux. The above species belongs to the section of *Odontolabis* having (like *O. bicolor*, *O. Dejeanii*, and other species) the prothorax broad, with the sides dilated, and the fore tibiæ curved; it is one of the largest species of Lucanoid Coleoptera, and, when found with the mandibles fully developed, must indeed be gigantic. It is dedicated to Count de Castelnau, to whom Entomologists are much indebted for many interesting novelties.

Odontolabis striatus, ♂, ♀, H. Deyrolle, MS.

A new and interesting species from Malacca, in the collection of Count Mniszech, the description of which will appear in the Ann. Soc. Ent. Fr. for 1864. Both the ♂ and ♀ are strongly pubescent, and in this respect the species assimilates somewhat to *O. Dalmani*, Hope; but in its general form it approximates more nearly to *O. platynotus*, Hope, with which I have for the present located it.

Odontolabis Brookeanus ♂, ♀, Voll. Tijd. v. Ent. iv. 107, tab. vi. fig. 1. (Pl. VI. fig. 5, var. max.)

O. fuscus, nitidus; elytris pallide testaceis, suturâ tenui nigrâ; mandibulis dilatatis depressis, capite parum brevioribus, arcuatis, interne denticulatis; prothorace plagâ nigrâ maculato, angulis posticis valde emarginatis; tibiis anticis curvatis supra sulcatis, extus 2 aut 3 spinis minutis armatis, quatuor posticis inermibus.

(Var. max. ♂) differt mandibulis longioribus gracilibus falcatis apicibus acutis, prope basin unidentatis et intus pone medium

spina magna furcata instructis; clypeo producto, vix emarginato.

Fœm.—Mandibulis brevibus, punctatis, interne bidentatis, labro parvo transverso; capite parvo, nigro-brunneo, rugose punctato; prothorace plagâ nigrâ maculato, angulis posticis emarginatis; elytris litera V basi descendente nigro-signatis; pedibus nigris; tibiis anticis dilatatis, extus spinis tribus obtusis instructis, posticis intermediisque inermibus.

Long. corp. ♂ (mandib. incl.) unc. 2; mandib. (var. max.) 5 lin.

Hab. Borneo.

A description and figure (of the var. minor) of this species have been already published by M. van Vollenhoven (loc. cit.); a second description of it, accompanied by a figure of the var. max., will probably not prove uninteresting. Numerous specimens of this insect were sent to England by Mr. Wallace and distributed among various collections. I may remark, that the black plagæ, both on the prothorax and body, are very variable, and in some specimens totally wanting. Of males with fully developed mandibles but two or three were to be found, one of which is now figured.

Odontolabis Sommeri ♂, Parry (var. max., ♀ ignota). (Pl. VI. fig. 4.)

O. capite pronoto pedibusque brunneo-testaceis; capite magno, antice emarginato, pone oculos supra et infra angulato; mandibulis gracilibus, falcatis, capite paulo brevioribus, apicibus acutis, intus bidentatis; prothorace antice acute angulato, postice valde emarginato; tibiis anticis curvatis, extus spinis duabus aut tribus armatis, posticis inermibus.

Long corp. unc. 1, lin. 5; mandib. circa lin. 5.

Hab. Manilla. Mus. Dom. Sommer (Altonæ).

I am indebted to Count Mniszech for the description and figure of the above; it appears to be allied to the Bornean species *O. Brookeanus*.

Odontolabis Cingalensis ♂, Parry, var. max. (Pl. X. fig. 8.)

O. niger, nitidus; capite magno, subquadrato, margine antico elevato, pone oculos inflato; mandibulis capite prothoraceque longioribus, subdepressis, arcuatis, intus ad apicem dente obtuso bifido armatis, apicibus furcatis; prothorace transverso, angulis posticis emarginatis; elytris lævissimis,

attenuatis; tibiis anticis curvatis, ad apicem spina minuta extus instructis, quatuor posticis inermibus.

Long. corp. unc. 1, lin. 8; mandib. lin. 9.

Hab. Ins. Taprobana.

The above insect seems to be rather abundant in Ceylon, numerous specimens having fallen under my notice, but those with highly-developed mandibles appear to be scarce. In Sir Emerson Tennant's History of Ceylon, i. 27, Cat. of Coleop., the name *Cingalensis* is misprinted *Bengalensis:* in the same work, the genus *Singhala* (sp. *tenella*, Blanchard), belonging to the family of the *Rutelidæ* (vid. Cat. Coll. Mus. Hist. Nat. Paris, part 2, p. 198), is erroneously placed with the *Lucanidæ*.

ODONTOLABIS NIGRITA, H. Deyrolle, MS.

A new species from Ceylon, in the collection of Count Mniszech. According to M. Henri Deyrolle, closely allied to *O. Cingalensis;* a description will shortly appear in the Ann. Soc. Ent. de France. It will form, together with *O. Cingalensis* and *O. æratus*, the third section of the genus *Odontolabis*, having elongate mandibles, but the head, instead of being armed with a spine behind the eyes, is only slightly inflated, the body depressed and highly polished, and the anterior tibiæ are curved. The sub-genus *Calcodes* of Westwood (vide Hope's Catalogue) is incorporated with this section, the metallic colour of *Calcodes æratus* forming only one of its chief characters.

[Gen. HETEROCHTHES, Westw.*

Genus (vel sub-genus) novum inter *Anoplocnemum* et *Odontolabidem* collocandum. Caput maribus magnum, transverso-quadratum, lateribus pone oculos haud tuberculatum, margine antico fere recto, clypeo in tuberculum parvum porrecto. Antennæ clava tripartita. Mandibulæ maribus dente parvo sub-apicali intus armatæ. Maxillæ in utroque sexu inermes. Prothorax transversus, lateribus inermibus, parallelis, angulis posticis rotundatis. Tibiæ anticæ extus 4-dentatæ, mediæ et posticæ inermes. Elytra brevia, ovata, haud striata.

This new and interesting sub-genus approaches most nearly to *Odontolabis*, but the insects in that group have the head deeply emarginate in the middle of the anterior margin, as well as armed with a strong spine on each side of the head behind the eyes; and the

* I am indebted to my friend Prof. Westwood for this description, together with others hereafter mentioned; it formed part of an interesting paper on Lucanoid Coleoptera read by him before the Society on the 4th January, 1864.

tarsi are here much shorter. The female has much the appearance of *Odontolabis glabratus*, De Haan, but the sides of the prothorax are regularly rounded. From *Macrognathus*, Burm., as well as from *Platyprosopus*, Hope, *Heterochthes* differs in having the middle tibiæ without a central spine, and in the form of the head and prothorax.

This new form affords a proof of the advantage afforded in the classification of the *Lucanidæ* by the number of the spines upon the tibiæ, especially of the middle and hind legs, as an examination of this character at once leads us to the true affinities of the insect. Instances may indeed occur in which the tibial spurs are liable to be almost obsolete, but the finger will often detect them when the eye cannot clearly perceive them; besides which, of course, this character, like every other, is liable to modification, and is not to be depended upon with absolute certainty, but in a very large majority of cases it truly indicates natural groups.

I am much indebted to Major Parry for affording me the opportunity of examining, describing and figuring this new Lucanoid form, rendered as it is the more interesting by the possession of both sexes, as well as of the minor development of the male sex.

HETEROCHTHES BRACHYPTERUS, Westw. (Pl. X. fig. 6, ♀, fig. 7, ♂; Pl. XI. fig. 1, 2, 3.)

Cladognathus brachypterus, Parry, MS.

H. niger, piceo vix tinctus; disco suprà lævi nitido et fere impunctato, lateribus elytrorum punctatis exceptis; femoribus tibiisque castaneis.

♂ maj. Long. mandib. lin. $5\frac{1}{2}$; capitis, lin. $3\frac{1}{2}$; prothor. lin. $2\frac{1}{2}$; elytr. lin. $5\frac{5}{6}$ = long. tot. lin. $17\frac{1}{3}$. Latit. capitis, lin. $5\frac{1}{2}$; prothor. lin. 5; elytr. lin. 5.

♂ min. Long. mandib. lin. 1; capitis, lin. $2\frac{1}{2}$; prothor. lin. 2; elytr. lin. 5 = long. tot. lin. $10\frac{1}{2}$. Latit. prothor. lin. 4; elytr. lin. $4\frac{1}{4}$.

♀ Long. mandib. lin. $1\frac{1}{2}$; capitis, lin. $1\frac{1}{3}$; prothor. lin. 2; elytr. lin. 4 = long. tot. lin. $8\frac{5}{6}$. Latit. capitis, lin. $2\frac{2}{3}$; prothor. lin. 2; elytr. lin. 4.

Habitat in Cambodia. D. Mouhot. Mus. Parry et Saunders.

The male has the head much larger than the prothorax, flattened, transverse-quadrate, the fore-margin nearly straight, the front vertical, slightly concave, with the upper edge acute; the centre of the clypeus produced into a rounded tubercle; the sides behind the eyes (which are entirely divided by the canthus) very finely and distantly punctured and slightly sinuated, but not produced into a decided tubercle or spine. The mandibles in the larger

specimens are longer than the head, flattened, curved at the base, and strongly incurved at the apex, the middle part being nearly straight, with a small conical point at a short distance from the apex on the inner edge. The antennæ are small, with a three-jointed clava; the maxillæ have the outer lobe of moderate length, and strongly ciliated; the palpi have the terminal joint somewhat sabre-shaped; the mentum is very short and broad, with the anterior angles rounded off. The prothorax has the sides straight and nearly parallel, the anterior angles acute, and the hind ones rounded off without any spine or lateral conical point. The elytra are short and ovate, without any longitudinal striæ. The fore tibiæ are rather long, with two teeth on the outer edge, exclusive of the two strong ones at the apex. The four posterior tibiæ are destitute of a spine in the middle. The prosternum terminates in a slightly dilated and convex ridge between the base of the fore legs. The tarsi are very short. The mesosternum is slightly channelled along the middle.

The small variety of the male has the head smaller than the prothorax, and the latter comparatively smaller than in the larger individuals, with its sides rather more rounded; the front margin of the head is somewhat emarginate, and the sides behind the eyes are marked with large punctures; the mandibles are shorter than the head, strongly curved, with a large conical tooth near the base on the inner edge, and the apex obtusely bifid; the mesosternum has also a rather deeply impressed, narrow, punctate channel.

The female has a much smaller head, the canthus forming an angle at the sides in front of the eyes; the front of the head is slightly emarginate, and the clypeus produced into a small quadrate setose lobe; the sides of the head are very strongly punctured. The prothorax has the sides also punctured, and the lateral margin is more rounded than in the male, especially at the posterior lateral angles. The elytra have the sides and extremity punctured. The palpi are rather shorter and stronger than in the male, but the tibiæ of all the legs are spined, as in the other sex.

Plate XI. Fig. 1. The large male somewhat magnified. 1*a*, outline of portion of the head; 1*b*, front of the head seen from the front; 1*c*, maxilla; 1*d*, mentum; 1*e*, mentum seen from within, with the labium and palpus; 1*f*, antenna; 1*g*, prosternum seen from beneath; 1*h*, ditto, seen sideways.

Fig. 2. The small-sized male. 2*a*, outline of the side of the head; 2 *b*, mandible.

Fig. 3. The female. 3*a*, the head; 3*b*, the eye, divided by the canthus; 3*c*, antenna; 3*d*, maxilla; 3*e*, mentum; 3*f*, labium and palpus.—J. O. W.]

Gen. Neolucanus, Thomson, Ann. Soc. Ent. Fr. 1862, p. 415.
Odontolabis, Hope, Cat.
Anodontolabis, Parry, MS. (vid. Tr. Ent. Soc. ser. 3, vol. i. p. 447).

The species, now amounting to eight in number, which compose this genus, belong to the second section of the genus *Odontolabis* of Hope. One of its chief characters is the absence of the spine behind the eyes; it also differs essentially in the size of the mandibles, which never attain to any considerable development, and seldom exceed the length of the head. The species are from East India, China, and the islands of the Indian Ocean.

Neolucanus Saundersii ♂, Parry. (Pl. IX. fig. 3.)

N. fusco-brunneus, nitidus; mandibulis capite paulo longioribus, curvatis, intus excavatis, versus apicem irregulariter serrate dentatis, dentibusque duobus robustis, suberectis; capite antice emarginato, angulis ante oculos acutis; prothorace lateribus antice rotundatis, angulis posticis emarginatis; elytris glabris, extus marginatis; tibiis anticis irregulariter spinis 4 vel 5 instructis, quatuor posticis inermibus.

Long. corp. unc. 2; mandib. lin. 6.

Hab. Ind. Or. Coll. Parry (spec. unicum).

The totally different form of the mandibles, and especially the two very singular sub-erect teeth with which each of them is armed, sufficiently distinguish this insect from *O. Baladeva*, Hope, to which in its general form it has a remarkable similarity.

Neolucanus cingulatus ♀, Parry. (Pl. IV. fig. 3.)

N. nigro-castaneus, nitidus, subparallelus; elytris singulis vittâ obliquâ flavâ ab humero ad apicem notatis.

Long. corp. unc. 1, lin. 3.

Hab. Malacca. Coll. Castelnau (spec. unicum).

I am indebted for my acquaintance with this species, and also for the drawing from the pencil of M. Migneaux, to Count Mniszech. It is allied to *O. castanopterus*, Hope, from northern India.

Neolucanus Championi ♂, Parry.

L. niger, sub-opacus; prothoracis elytrorumque lateribus paululum explanatis; mandibulis brevibus, apicibus subfurcatis, lateribus intus excavatis, sex-denticulatis; capite prothoraceque granulosis.

Long. corp. (mandib. incl.) lin. 14.

Hab. China.

This species is similar both in form and character to *N. Sinicus*,

described and figured by Mr. W. Saunders in Trans. Ent. Soc. N. S. iii. 48, pl. iv. figs. 2 & 3; the colour of the latter is dark chestnut, whilst *L. Championi* is dull black; it was taken by the late Major Champion at Hong Kong, but specimens have subsequently been received from the interior of China, collected by Mr. Fortune.

Gen. Cladognathus, Burm. Handb. d. Ent. v. 364.
Macrognathus, Hope, Cat. p. 5.
Metopodontus, Id. p. 4.
Prosopocoilus, Id. p. 4.

This genus, to which Dr. Burmeister united *Hexarthrius* and *Cyclophthalmus* of Hope, includes a larger proportion of species than any other belonging to the Lucanoid Coleoptera, comprising nearly sixty in number; which, with the exception of a few from the eastern and western coasts of Africa, are all either from India and China, or the islands of the Indian Ocean. It includes also the sub-genera *Metopodontus* and *Prosopocoilus* of the same author, both established with reference to the number of spines upon the tibiæ as well as upon the bimucronated and excavated anterior part of the head.

First, with regard to the tibial spines: these are often found to be most variable, and as generic characteristics are, I think, unworthy of the importance which has been attributed to them, especially as a rigid adherence to such a system necessitates the wide separation of species in all other respects intimately related.

Secondly, with regard to the binodose or strongly excavated character of the anterior portion of the head: this formation is so entirely dependent upon the development of the individual, that it cannot be regarded even as a specific, much less a generic character. I have, therefore, deemed it advisable to unite both *Metopodontus* and *Prosopocoilus* with the genus *Cladognathus* of Dr. Burmeister, which must only be considered after all as a temporary refuge for a vast number of species, forming a peculiar group in this family, and sufficiently aberrant in form and character to justify perhaps their separation into several genera, but our present knowledge of the species is too limited to warrant more than a sectional arrangement.

Cladognathus politus ♂, Parry (♀ ignota). (Pl. X. fig. 5.)
C. castaneo-fuscus, nitidus; mandibulis brevibus, curvatis, dentibus tribus armatis; capite supra oculos angulato;

elytris glaberrimis, sutura late nigro-fusca; tibiis anticis denticulatis, quatuor posticis unispinosis.

Long. corp. unc. 1, lin. 4; mandib. lin. 4.

Hab. Ind. Or. Coll. Parry (spec. unicum).

Head with the vertex smooth, punctured, more thickly so on the sides. Mandibles scarcely longer than the head, depressed, gradually curved, with a strong prominent tooth near the base, and two smaller ones before the tip; clypeus faintly trilobed. Head deeply emarginate in front, anterior angles bisinuate, deeply and coarsely punctured on the sides, slightly depressed on the vertex. Prothorax wider than the elytra, closely punctured in front and at the sides. Posterior angles armed with a small spine. Scutellum punctured. Elytra smooth, of a ferruginous brown, the sutural portion nearly black, minutely and sparsely punctate, more especially at the sides; humeral angles prominent.

CLADOGNATHUS QUADRINODOSUS ♂, Parry (♀ ignota).
(Pl. VIII. fig. 4.)

C. ferrugineo-fuscus; capitis vertice minute quadrituberculato; mandibulis gracilibus, porrectis, apicibus acutis, intus spinis 8 vel 9 minimis irregulariter dentatis; tibiis intermediis denticulo minimo instructis, posticis inermibus; tarsis subsetosis.

Long. corp. lin. 9; mandib. lin. 5.

Hab. Ind. Or. Coll. Parry, etiam Mus. Brit.

Above ferruginous-brown, beneath lighter. Head deeply punctured, with four minute tubercles arranged transversely on the vertex. Mandibles elongate, narrow, and acute at the tips, of the same length as the body, and armed with 8 or 9 minute teeth and tubercles. The sides of the thorax almost straight. Body convex. Outer edge of front tibiæ minutely crenulated.

CLADOGNATHUS CINCTUS, Montrousier, Faune de l'Ile de Woodlark, p. 27.

This species is also, according to Mr. Wallace, found in the Islands of New Guinea, Ki and Arou, and must be considered as very questionably distinct from *C. Bison*, differing in having the four posterior femora entirely black beneath, and the anterior with a small rufous spot, whereas in *C. Bison* the rufous patch exists on all the femora; in other respects they appear to be closely allied. I am not acquainted with a fully developed specimen; those in the collection of Mr. Wallace, and my own, being medium varieties.

Cladognathus Wallacei ♂, Parry (var. max., ♀ ignota).
(Pl. VII. fig. 2.)

C. niger; elytris dorso fusco-castaneo, lateribus nigro-marginatis, vittâ flavâ latiusculâ notatis; labro producto, trigonoconico; mandibulis porrectis, haud arcuatis, irregulariter denticulatis, et intra basin versus fortiter emarginatis; tibiis anticis extus irregulariter denticulatis, quatuor posticis inermibus.

Long. corp. fere unc. 2; mandib. lin. 8.

Hab. Ins. Gilolo. Coll. Wallace.

Mandibles nearly straight, slightly curved from the base to the apex, which is bifurcate, the general surface flattened; internally at the base deeply emarginate, with one strong tooth just before the middle, and two smaller ones behind and before it.

Head with a large oblique flattened space on the crown, emarginate in front, anterior angles obliquely truncate, sides slightly swollen behind the eyes; labrum short, subtriangular, general surface shining, but very delicately shagreened, covered beneath with ferruginous hairs. Prothorax considerably wider than the head, smooth, anterior angles somewhat produced, and truncate; anterior and posterior margins bisinuate, sides slightly waved, posterior angles obliquely truncate. Elytra widest just below the humeral angle, deep chestnut brown, narrowly margined with black, with a widish yellow vitta extending from the shoulder nearly to the apex, the vitta narrowest at the humeral angle. Legs black, anterior tibiæ armed externally with two teeth and a few slight crenulations, intermediate and posterior tibiæ unarmed; femora and trochanters of intermediate and hind legs furnished behind with a narrow line of brownish hairs.

This unique and fine species is named after A. R. Wallace, Esq., to whose indefatigable exertions natural history in general is so much indebted. Although somewhat approaching in general appearance the gigantic species of the genus *Odontolabis*, it bears nevertheless, I think, a nearer affinity to the species of that section of the genus *Cladognathus* which Mr. Hope in his Catalogue designated as *Prosopocoilus*, and of which *Cladognathus Lafertei* may be considered the representative.

Cladognathus Lafertei ♀. (Pl. VIII. fig. 5.)

C. Lafertei ♂, Reiche, Revue Zool. 1852.

Fœm.—C. fuscus; capite rugoso-punctato, postice lævigato; mandibulis brevibus, rugosis, unidentatis; elytris pallide ferru-

gineis, inæqualiter punctatis, suturâ ad basin marginibusque nigro-fuscatis.

Long. corp. (mandib. incl.) unc. 1.

Hab. N. Hebrides.

Female with the head rather coarsely punctured, except on the vertex, which is smooth. Mandibles short, punctured, the left with a tooth a little before the apex, the right with one near the base. Prothorax coarsely punctate, especially at the sides and in front; elytra punctate, having some of the punctures disposed in lines; the external margin of the front tibiæ crenulated, of the intermediate and posterior armed with a single spine.

This species was found rather abundantly at New Hebrides, by Mr. M'Gilleray, the naturalist to the expedition of H. M. S. Herald.

The locality of New Holland assigned to it by Mons. Reiche appears to be erroneous.

Cladognathus Tragulus, Voll. (Pl. VII. fig. 6).

♂ *C. Tragulus*, Voll. Tijd. v. Ent. iv. 113, tab. vii. fig. 4, 5, 6 (1861).

C. productus, Parry, Proc. Ent. Soc., 1862, p. 109.

Fœm.—C. niger, subnitidus; clypeo parvo, rotundato; mandibulis brevibus, arcuatis, unidentatis, rugoso-punctatis; capite rugoso-punctato, postice lævi; prothorace antice angustato, lateribus rotundatis, fusco-cinnamomeis, plagâ obliquâ nigrâ notatis; tibiis quatuor posticis denticulo parvo armatis.

Long. corp. lin. 11—12.

Hab. Ternate (nec Sumatra).

On my recent visit to Leyden, having an opportunity of consulting the specimens described by M. van Vollenhoven in his interesting memoir above referred to, I ascertained that the insect described and figured by him, fig. 6, as the ♀ of *Tragulus* is in fact the ♀ of *D. purpurascens* (var. *Saiga*?); vid. tab. vii. fig. 1.

There are several specimens in the collection, and M. van Vollenhoven kindly presented me with the one from which the present diagnosis is drawn up. With reference to my description of *C. productus* ♂, as having the intermediate tibiæ unarmed, I find, having subsequently examined numerous fully developed specimens, that this is an error, and upon again referring to the type specimen in Mr. Wallace's cabinet the rudiment of a very minute tubercle, but scarcely visible to the naked eye, is found to

exist; this tubercle ought to have been represented in Pl. VII. fig. 6.

Cladognathus assimilis ♀, Parry (♂ ignotus).
productus ♀, Parry, Proc. Ent. Soc., 1862, p. 109.

Fœm.—C. niger, subnitidus; clypeo parvo, rotundato; mandibulis brevibus, unidentatis; capite antice rugoso, punctulato, postice lævisculo; prothorace antice angustato, lateribus oblique rotundatis, fulvo-brunneis, in medio nigro-maculatis; elytris fulvo-cinnamomeis, marginibus externe et sutura tenuiter nigris; pedibus rugoso-punctatis, nigris; tibiis intermediis denticulo minuto armatis, posticis inermibus.

Long. corp. (mandib. incl.) unc. 1.

Hab. Ins. Waigiou. Coll. Wallace. Specimen unicum.

The above description was originally given as that of the ♀ of *C. productus* (but which species has now proved to be identical with *C. Tragulus*, Voll.). I have, however, since my recent visit to Leyden, ascertained, as already previously stated, that it is not the ♀ of *C. Tragulus*, from which it differs in the uniform colour of the elytra and in the posterior tibiæ being unarmed. Unfortunately the ♂ of this new species is at present unknown.

Cladognathus Zebra ♂, Oliv. Ent. i. 24, 20, tab. v. fig. 17.
Thunb. Mem. Nat. de Moscou, i. 206.
Voll. Tijd. v. Ent. iv. 108.
(Pl. IV. fig. 5, ♀.)

Lucanus Zebra. Mandibulis porrectis, versus apicem denticulatis; thorace elytrisque testaceis, nigro-maculatis.

Lucano suturali paulo major. Mandibulæ porrectæ, longitudine capitis, denticulatæ, nigræ. Caput nigrum, fulvo-pubescens. Thorax lævis, testaceus, maculâ magnâ dorsali, maculâ oblongâ utrinque punctoque marginali nigris. Elytra testacea, maculâ baseos vittâque mediâ latâ abbreviatâ nigris.

The above is Olivier's description of this rare species; the type specimen (♂) described from the cabinet of M. Raye is now in the Museum of Leyden, with the locality of "Birman Empire" attached to it, although Olivier makes no mention of its habitat. The ♀, a single specimen of which is in the collection of Count Mniszech, is now figured Pl. IV. fig. 5.

Cladognathus suturalis ♂, Oliv. Ent. i. 16, tab. iv. fig. 12.
Lucano parallelipipedo paulo major. Antennæ nigræ. Mandibulæ

exsertæ, apice acutæ, intus basi denticulatæ, nigro-testaceæ, longitudine capitis. Caput supra testaceum, marginibus vittaque media bifurcata nigris. Thorax testaceus, elytris capiteque latior, marginibus tenuissimè puncto utrinque vittaque media nigris. Scutellum nigrum. Elytra testacea, marginibus tenuissimè suturâque nigris. Corpus subtus pedesque nigro-brunnea.

Long. unc. 1, lin. 3.

Hab. Siam aut Malacca.

Another rare species to which Olivier assigns no locality; the only specimen I am acquainted with is in my own collection; it is either from Siam or Malacca. Closely allied to *O. occipitalis*, Hope, from which the unarmed posterior angles of its head, independent of its coloration, amply suffice to distinguish it.

Cladognathus perplexus ♂, Parry (var. minor, ♀ ignota).

C. rufo-castaneus, sublente minute punctatus, marginibus suturaque nigrescentibus; mandibulis brevibus, apicibus acutis, marginibus internis intus sex-dentatis; tibiis intermediis minute tuberculatis, posticis inermibus.

Long. corp. (mandib. incl.) unc. 1.

Hab. Ind. Or. Coll. Parry.

A single specimen only of the above is in my collection; it most resembles in general appearance and colour the var. minor of *C. dorsalis*, Erichson, differing however in having the intermediate tibiæ slightly armed and in the colour of the elytra being uniform, whereas in *C. dorsalis* the disk of the elytra is remarkable for its shiny polished character, whilst the sides are sub-opaque.

Cladognathus attenuatus ♂, Parry (♀ ignota). (Pl. IV. Fig. 2.)

C. fulvo-testaceus; mandibulis, antennis, pedibusque luteo-squamosis; mandibulis arcuatis, capite parum brevioribus, intus irregulariter serratis; prothorace capite latiori, lateribus fere rectis, angulis posticis emarginatis; elytris angustis, versus apicem attenuatis; tibiis anticis extus quadridenticulatis, quatuor posticis inermibus; tarsis subtus setosis.

Long. corp. (mandib. incl.) lin. 11.

Hab. Malacca. Coll. Castelnau et Mniszech.

Cladognathus squamilateris ♂, Parry (var. minor).

C. fusco-niger, nitens, subparallelus; mandibulis brevibus, ir-

regulariter minute dentatis; elytrorum prothoracisque marginibus lateralibus pilis cinereis tectis; tibiis quatuor posticis inermibus.

Long. corp. (mandib. incl.) unc. 1.

Hab. Borneo, Malacca. Coll. Parry, Wallace et Saunders.

Since my notice of this species in the Proc. Ent. Soc., 1862, p. 110, specimens of both sexes have been received from Malacca; the female is also characterized by having the sides of the prothorax and elytra covered with a thick greyish pubescence, whilst the remainder of the body is of a highly polished character.

Cladognathus elegans ♂, Parry (♀ ignota). (Pl. VIII. fig. 3.)

C. cinnamomeus, gracilis; mandibulis capite paulo longioribus, arcuatis, depressis, ante apicem dente truncato instructis; capite antice fortiter emarginato; elytris punctatis, subtiliter striatis, sutura fuscata.

Long. corp. (mandib. incl.) lin. 8.

Hab. Ind. Or. Coll. Parry.

Of a cinnamon-brown; mandibles flattened, gradually bent to the apex, which is very acute, externally before the tip is a broad, flat, truncate tooth, separated from the apex by a deep longitudinal fissure; sides of the prothorax with numerous scattered punctures, the middle smooth except on the dorsal line, where it is sparsely punctate; above the posterior angle is a slight blackish tubercle; the anterior and posterior margins are somewhat fuscous. Elytra with the suture very smooth, polished and brown, the rest cinnamon-coloured, rather thickly punctured and striated, the striæ disappearing before the tip. Anterior tibiæ armed externally at the apex with three teeth, and with a minute one about the middle; posterior tibiæ simple, with lines of punctures. Abdomen beneath with the segments narrowly margined with brown.

Cladognathus flavidus ♂, Parry (var. max., ♀ ignota). (Pl. VIII. fig. 2.)

C. castaneus; mandibulis, capite, thorace, suturaque nigro-marginatis; mandibulis elongatis, subdepressis, intus quadridentatis, dente ante apicem obtuso, dente medio elongato subtrigono; tibiis inermibus.

Long. corp. unc. 1, lin. 6; mandib. lin. 5.

Hab. Ind. Or. Coll. Parry.

Yellowish-chestnut, margined with black. Head broader than long, rather narrower than the prothorax; sides behind the eyes

slightly arcuate, in front notched. Mandibles as long as the head and prothorax together, depressed, a small tooth near the base, a smaller blunt tooth behind the middle, closely followed by another rather large and triangular; close to the apex is an obtuse tooth, separated from the preceding by a rounded sinus. Prothorax chestnut, narrowly margined with black, considerably wider than the elytra at the base, sides slightly rounded, obliquely emarginate behind, the emargination with a tooth in front, and above the posterior angles a fovea. The elytra of a pale chestnut-brown, finely and closely punctured, shining, the suture somewhat darker, the humeral angles prominent. The tibiæ are all entirely without teeth.

Cladognathus fulvonotatus ♂, Parry (var. max., ♀ ignota). (Pl. VI. fig. 3.)

C. nigro-brunneus, æneo-tinctus; prothorace lateribus fulvo-bimaculatis; elytris dorso valde politis, linea fulva pone humerum fere ad apicem ducta notatis.

Long. corp. lin. 10; mandib. lin. 4.

Hab. Ind. Or. (Cherra Pounga, Ponjee?) Coll. Parry.

Head smooth, dark brown, with a slight greenish hue; mandibles elongate, narrow, sides nearly parallel, apex slightly forked, with a wide, somewhat truncate bifid tooth just beneath; clypeus slightly sinuate. Prothorax of the colour of the head, anterior and lateral margins passing into ferruginous brown; on each side are two fulvous spots, nearly parallel with the lateral margin, the posterior the largest, ovate; scutellum slightly punctured. Elytra with the disc flattened and highly polished; from behind each shoulder a fulvous line proceeds nearly parallel with the sides, curves towards the suture near the apex, and is dilated towards the end. Underside of body and sides of mandibles ferruginous; all the femora have a broad fulvous ring; the fore tibiæ are irregularly serrated on the outer edge, the intermediate with one small tooth about the middle, and the posterior unarmed.

Cladognathus bisignatus, Parry. (Pl. VII. fig. 3 ♂, 5 ♀).

C. niger, subæneus, glaberrimus; mandibulis brevibus, in medio unidentatis; elytris singulis ad apicem macula (♀) aut striga (♂) fulva notatis; femoribus intermediis et posticis fulvo-maculatis.

Long. corp. (mandib. incl.) lin. 10.

Hab. Ind. Or. (Cherra Pounga, Ponjee?). Coll. Parry.

Head of ♂ smooth, with a few scattered punctures near the eye; mandibles of the same length as the head, acute at the apex, in the middle with a projecting lobe, the edge of which is crenulated; the clypeus wider than in the ♀, slightly emarginate; the prothorax is smooth, darker than the elytra, slightly convex, posterior angles rounded; elytra smooth, æneous, with a row of minute punctures near the suture, and parallel with it an oblique yellow line near the apex; the femora of the four posterior legs on the underside with a small yellow patch; the anterior tibiæ irregularly crenulated externally with four or five prominent tubercles; the intermediate are armed with a small spine, the posterior unarmed. The ♀ is broader and more convex than the ♂, the head is distinctly punctured, with two slight elevations on its surface; mandibles short and acute, with a distinct tooth in the middle; the prothorax is very smooth on the disc, distinctly punctured on the sides as well as upon the anterior and posterior margins, with the hinder angles rounded. Scutellum with a few scattered punctures; elytra more convex than in the ♂, with the sides parallel, smooth in the centre, but punctured at the base, lateral margins and apex, and with a small, yellow, nearly round spot near the apex. The fore tibiæ are crenulated, with four or five small prominent tubercles, the four posterior are armed with a small spine near the centre, and as in the ♂ the four posterior femora have a small fulvous patch on the underside.

Cladognathus modestus ♂, Parry (♀ ignota). (Pl. XII. fig. 1.)

C. brunneo-castaneus vel nigro-piceus, prothoracis et elytrorum lateribus fulvis; capite, mandibulis, tarsis, antennisque nigris; capite transverso, parvo, tenuissime granuloso, antice depresso, paulo emarginato, pone oculos obtuse angulato; mandibulis gracilibus, capite paulo longioribus, curvatis, rugoso-punctatis, ante medium dente interno obtuso suberecto armatis, apicibus dilatatis, bidentatis; prothorace angulis anticis rotundatis posticisque obliquis, minute granuloso, disco nitido; elytris castaneis, nitidis, marginibus latis luteis, subopacis; corpore infra nigro-rufescente; tibiis anticis extus serrulatis, 4 posticis inermibus.

Long. corp. lin. 10; mandib. lin. 2.

Hab. in Africa occ. tropicali. Coll. Parry. Specimen unicum.

The general appearance of this new species allies it closely to *C. faber*, Thomson, from which, however, it may readily be dis-

tinguished by the short obtuse posterior angles of the head, the oblique posterior angles of its prothorax, and the well-defined luteous margin of the elytra.

For the figure of this species, and the following description and remarks, I am indebted to Prof. Westwood.*

[This species somewhat closely resembles *L. faber*, Dej., from Guinea, especially in the toothing of the mandibles, but that species possesses a spine in the middle of the intermediate tibiæ. It is most nearly allied to *Cl. picipennis*, Hope, Cat. Lucan., from Cape Palmas, but the head of that species has the lateral margins behind the eyes only slightly dilated, and the mandibles of the large variety of the male are differently toothed: it has also a triangular point in the middle of the clypeus. The upper surface of the head is opaque, and entirely covered with extremely minute granules (as is also that of the prothorax), the space behind the eyes being strongly punctate. The anterior lateral angles of the head are obliquely truncate, posteriorly produced, somewhat rounded and extending half across the eye: in front of the eye is a moderately raised obtuse tubercle. The anterior margin of the head is bisinuated, the clypeus being transverse, short, with the anterior rounded. The lateral margin of the head, behind each of the eyes, is produced into a rounded lobe. The mandibles are rather longer than the head, somewhat slender, regularly curved, strongly punctured, with an obtuse spine directed inwards beyond the middle of the inner margin; the apex somewhat digitated, with a small subapical tooth, between which and the spine is a broad obtuse tooth. The mentum is of moderate width and very rudely punctured. The prothorax is rather broader and more glossy than the head, with the anterior angles rounded, the sides but slightly oblique and the hind lateral angles obliquely truncate; the sides are broadly dark fulvous, with a very slender raised black margin also extending along the bisinuated hind margin of the prothorax: near the hind angles is a dark lateral spot on each side; the scutellum is very finely punctured, as is also the base of the elytra. The latter are very glossy, almost quite smooth, very dark chestnut down the middle, with a broad lateral border of fulvous, the extreme lateral margin being raised and black. The legs are pitchy black, with the femora castaneous, the fore tibiæ are serrulated along the outer edge and armed with three stronger teeth at the apex, the four posterior tibiæ are destitute of a spine in the middle of the outer margin. The body

* See note *, *ante*, p. 17.

beneath is dark castaneous, glossy, almost impunctate, with the abdomen black.

Pl. XII. fig. 1. The insect somewhat magnified; 1*a*, the left side of the head with the clypeus; 1*b*, the extremity of the right mandible; 1*c*, the mentum, with the four palpi in situ.—J. O. W.]

Cladognathus decipiens ♀, Parry. (Pl. IV. fig. 4.)

C. niger, nitidus; elytris fusco-castaneis, marginibus vitta flava latiuscula notatis; capite parvo, antice impresso, tenuissime punctato; prothorace lateribus rotundatis, dorso postice utrinque foveolato; elytris lævibus; tibiis anticis angustis, extus crenulatis, quatuor posticis unidentatis, tarsis subtus setosis.

Long. corp. unc. 1.

Hab. Malabar.

The only example of this species with which I am acquainted is in the cabinet of Count Mniszech. In the rich collection of the Leyden Museum there exists an undescribed ♂ specimen, the general sculpture of which induces me to refer it to the present species; but the habitat not being given, and the fact that the head affixed to the specimen has the appearance of belonging to a different species, prevent me from speaking with greater certainty as to their identity.

Cladognathus dorsalis, Erichson, Act. Acad. Cæsar. Leopold. v. 16, Suppl. tab. 37, fig. 6.

♂ (var. max). C. castaneus, plagâ magnâ lævissimâ prope suturam; corpore subtus, antennis, mandibulis, pedibusque nigro-piceis.

Rufo-castaneus, nitidus; capite magno, antice emarginato, margine elevato; mandibulis capite cum prothorace paulo longioribus, falcatis, depressis, intus irregulariter armatis, apicibus curvatis; prothorace lateribus fere rectis, subopacis, angulis posticis paulo emarginatis, maculâ utrinque nigrâ indistinctâ versus angulos posticos, dorso nitido; elytris dorso lævissimo, lateribus subopacis; tibiis anticis rectis, denticulis 4 vel 5 parvis instructis, posticis quatuor inermibus.

Long. corp. unc. 1, lin. 5; mandib. lin. 7.

Erichson (l. c.) described the female only, the male being apparently unknown to him. Dr. Burmeister, Handb. d. Ent. v. 370, has referred *L. cavifrons* (Burm. MS.), Hope, Cat. p. 13, to the above described species; this is undoubtedly an error. Neither

the Rev. F. W. Hope nor Dr. Burmeister was acquainted with the veritable male of Erichson's species, which is now described for the first time, and which differs essentially from *C. cavifrons* (var. max.), Hope, by its broader and more convex form, the highly polished dorsal patch on the elytra, and in the structure of the mandibles, which in the insect now under consideration are somewhat broader, strongly curved at the apex, destitute of the flat basal tooth, and instead of the group of subapical teeth only, as in *C. cavifrons*, are armed with a stout tooth placed a little above their centre, with four or five smaller ones between it and the apical tip; some of these teeth, however, may be more properly called nodose elevations. The anterior tibiæ moreover are straight, and not curved as in *C. cavifrons*.

The female is equally to be distinguished from that of *C. cavifrons* by its more robust and convex form; the anterior tibiæ are considerably more dilated, their outer edge also strongly denticulated; the four posterior tibiæ, like all the females of this genus (with the exception of *C. cavifrons*), are armed with a single spine.

Cladognathus cavifrons, Hope.

♂ *Lucanus cavifrons*, Hope, Cat. p. 13 (var. max.).

♀ *L. tenuipes*, Id. Cat. p. 18.

Odontolabis tenuipes, Id. Cat. p. 5.

The only two specimens of *L. tenuipes*, Hope, with which I am acquainted are in the Hopeian Collection and the British Museum, and were obtained by Mr. Cuming during his visit to the Philippines; after careful examination, I have satisfied myself, from the general sculpture of the head and the short strongly-punctate mandibles, that both these specimens are females; but from the remarkable slenderness of the anterior tibiæ, and from the absence of spines on those of the four posterior legs, they have somewhat the appearance of males with short undeveloped mandibles. The specimen described by Mr. Hope is somewhat darker than that of the British Museum, assimilating more in colour with the male, which is chestnut-brown. While, on the one hand, the unarmed tibiæ of the four posterior legs would assign *tenuipes* to the genus *Odontolabis*, in which Mr. Hope placed it, its slender fore tibiæ and general structure of body place it indubitably with those insects which belong to the genus *Cladognathus*, and I am strongly inclined to believe that it is the ♀ of *C. cavifrons*.

Cladognathus approximatus ♂, Parry (var. max.).

C. nigro-castaneus, nitidus; capite subquadrato, antice depresso, emarginato, subopaco, confertissime punctulato; mandibulis gracilibus, capiti cum prothorace longitudine æqualibus, fere rectis, intus spinis 3—5 armatis, apicibus furcatis; prothorace transverso, elytris latiori, lateribus fere rectis, angulis posticis obtusis, dorso sublævigato, tenuissime granuloso; elytris nitidis, sublente minute punctulatis, apicem versus attenuatis; tibiis anticis extus irregulariter denticulatis, quatuor posticis simplicibus.

Long. corp. unc. 1; mandib. lin. 7.

Hab. Cochin China, Laos. Mus. Saunders et Parry ♂, ♀.

Collected by the late M. Mouhot, and allied to *C. Buddha*, Hope (Trans. Linn. Soc. xix. 107), the type specimen of which is in my own collection, but differs in the form and armature of the mandibles, in the head being wider and much less emarginate in front, and in the narrow and more attenuated form of the elytra.

Cladognathus eximius, Parry.

C. castaneus, nitidus (♂ var. med.); mandibulis nigris, capitis longitudine, subtrigonis, suprà crebre punctatis, intus obtuse denticulatis; capite magno, nigro-piceo, depresso, late semicirculariter emarginato, margine antice leviter elevato; prothorace transverso, capite elytrisque latiori, confertissime granuloso, angulis anticis rotundatis, posticis obtusis, lateribus utrinque macula nigra notatis; elytris tenuissime punctatis, suturâ late nigro-marginatâ; subtus fusco-ferrugineus; antennis pedibusque piceis; tibiis anticis extus serratis, intermediis spina acuta armatis, posticis tuberculo parvo instructis.

Long. corp. (mandib. incl.) unc. 1, lin. 4.

♀ Mandibulis brevibus, intus unidentatis; capite rugoso-punctato; prothorace lateribus rotundatis, parce fortiterque punctato, disco nigro-piceo; elytris crebre irregulariterque punctatis.

Long. corp. unc. 1.

Hab. Afric. Occ. Coll. Parry.

This species is allied both to *C. Senegalensis*, Klug, and *C. quadridens*, Hope, from which, however, its rich chestnut colour, similar to that of *C. Savagei*, Hope, at once distinguishes it.

Cladognathus Senegalensis, Klug.

Lucanus Senegalensis ♂, Klug, Erm. Reis. Atl. 38, 103.

Dr. Burmeister in his Handbuch der Entomologie, v. 371, gives this insect as synonymous with *Lucanus Antilopus* ♂, Swederus (Act. Holm. 1787, iii. 186, tab. viii. fig. 3); in this I do not feel disposed to agree, since Swederus describes the prothorax of his species as "lateribus subrotundatis," and figures the four posterior tibiæ as being unarmed—characters quite at variance with the true *Lucanus Senegalensis* of Dr. Klug, a specimen of which from my own collection I have recently compared with the typical insect in the Berlin Museum. This species is readily distinguished in having the posterior angle of the prothorax strongly emarginate, as well as the anterior angle of this emargination being armed with a small acute spine; hence Mons. Gory applied the specific epithet of *bispinosus* to the female (according to a specimen so ticketed in the Oxford Museum). The mandibles are nearly straight in all their different developments, and the four posterior tibiæ are armed each with a single spine. As regards the veritable *L. Antilopus* of Swederus, I am inclined, from the description as well as from the figure, to refer it to *Lucanus quadridens*, Hope (var. minor), with which it agrees in the form of the mandibles (representing evidently those of an undeveloped male, and characterized as such by the description "mandibulis capite vix longioribus"), in the posterior angles of the thorax being rounded, and in the absence of the spines from the four posterior tibiæ; although I must remark that in fully developed individuals a minute tubercle is occasionally seen on the intermediate tibiæ. These spines or tubercles on the tibiæ, however, are, as I have already had occasion to state, most capricious, depending considerably, as to their size, and even for their very existence, on the maturity of growth the insect may arrive at, and can in no way be relied upon either specifically or generically.

In respect to the *L. Antilopus*, Burm., Hand. der Ent. v. 371, this insect may possibly be identical with *L. Senegalensis*, Klug, but as no mention is made of the posterior angles of the prothorax being rounded or emarginate, or of the existence or non-existence of the spine alluded to by Dr. Klug, it is difficult to fix exactly the species to which it ought to be referred. If identical with *Senegalensis*, Klug, it certainly is not the *Antilopus* of Swederus; and should it be a more fully developed specimen of *Antilopus*, Swed., (as the mandibles are described as being as long as the head and

body together) it will then, I think, prove, as intimated above, to be synonymous with *L. quadridens*, Hope, a specimen of the latter in my own collection corresponding so exactly with both the description and figure of Swederus that it makes me very much disposed to unite them together.

Cladognathus curvipes, Hope, Cat. p. 25 (♀).

♂ C. subconvexus, niger, nitidus, tenue punctatus; capite magno, antice emarginato, crebre punctato, medio triangulariter impresso, lateribus pone oculos inflatis; mandibulis capite vix longioribus, suberectis, apicibus acutis, intus profunde excavatis et irregulariter denticulatis; prothorace lateribus (ut in ♀) subserratis, angulis anticis rotundatis, posticis obtusis, spina minuta armatis; elytris angulis humeralibus acutis; tibiis anticis irregulariter serratis, intermediis spina minuta instructis, posticis simplicibus.

Long. corp. (mandib. incl.) lin. 9.

Hab. Ind. Or. Coll. Parry.

In the female, which sex alone was known to Mr. Hope, the anterior tibiæ are curved exteriorly, whence the specific name; those of the male however are but very slightly curved. The small lateral spine existing on the prothorax of the male is often very indistinct in the female; the rudiment however of it is mostly to be traced. The peculiar formation of the mandibles in the present insect, and its small size, render it one of the most conspicuous species of the genus in which, for the present, I have placed it.

Cladognathus rudis ♀, Westw.* (Pl. XI. fig. 4.)

[*Dorcus* (*Prosopocoilus*?) *rudis*, Westw.

Fœmina.—Tota nigra, rude punctata; elytris costatis, interstitiis punctatissimis, capitis angulis anticis lateralibus obliquis, oculis septo dimidiatim incisis; prothoracis angulis posticis oblique emarginatis, elytris angulo humerali prominenti notatis.

Long. corp. (cum mandib.) lin. 10.

Hab. India vel Insulis Indicis? In Mus. D. Parry.

The unique insect on which this species is here proposed is a female of a glossy black colour, distinguished from the majority of the females of the genus *Dorcus* by the oblique emargination of

* See note * *ante*, p. 17.

the posterior angles of the prothorax, in which respect it agrees with *Luc. punctiger*, Hope (Cat. Lucan. p. 24; Linn. Trans. xviii. p. 592), but which differs from the present species in the elytra being destitute of costæ, and in its much less strongly punctured prothorax. The type specimens of the last-mentioned species are females, and are regarded with considerable probability by Major Parry as the other sex of *L. bulbosus*, Hope, which, with other African and Indian species, constitutes Mr. Thomson's second section of *Prosopocoilus*.

The head is very rudely punctured on the upper side; the anterior lateral angles are obliquely rounded off; the clypeus forms a bilobed projection; the mandibles are rather small, acute at the tips, with a tooth beyond the middle of the inner margin; on the middle of the crown are two irregular smooth patches, and there is a somewhat elevated space between each eye and the base of the antennæ; the eye is divided through its anterior half by the sharp curved canthus. The mentum is short, almost semicircular, and rudely punctured. The maxillæ are short, the inner lobe terminating in a sharp, hooked spine (a character also found in the female of *Pr. Martini*, Hope, an African species of this sub-genus). The labium is terminated by two elongated, strongly-setose lobes, and the labial palpi are rather long, slender, and with the terminal joint thick and ovate. The prothorax is strongly punctured, the sides are rounded and slightly serrulated, the posterior lateral angles are obliquely emarginate. The elytra are elongate, somewhat parallel, each with three strong costæ, the middle one interrupted near the shoulder; between the raised suture and the first costa are two slender lines edged with punctures, and the interstices between the costæ are very closely and finely punctured. The extremity of the elytra is also very thickly punctured. The body beneath is but slightly punctured, except at the sides of the metasternum and apical segment of the abdomen. The fore tibiæ are armed with five teeth, of which the two at the apex are the largest, and the four posterior tibiæ have a spine in the middle of the outer edge of each.

Pl. XI. fig. 4. The insect magnified. 4*a*, the head with one of the antennæ; 4*b*, the eye half divided by the canthus; 4*c*, maxilla; 4*d*, mentum; 4*e*, labium and palpi; 4*f*, prosternum; 4*g*, the same sideways.—J. O. W.]

Cladognathus Natalensis ♂ (var. max.), Parry.

C. piceo-castaneus; elytris castaneis, suturâ tenuissime nigricanti; mandibulis capitis prothoracisque fere longitudine, falcatis, apicibus dilatatis, furcatis, interne spina minima obtusa armatis; clypeo parvo, binodoso; capite transverso, cum pro-

thorace tenuissime granuloso, margine antico deflexo, vix emarginato, pone oculos spina obtusa armato; prothorace capite latiori, angulis posticis obliquis; elytris prothorace angustioribus, sublente minute punctulatis; pedibus, mandibulis, antennisque nigris; tibiis anticis irregulariter crenulatis, intermediis unidentatis, posticis tuberculo minimo instructis.

Long. corp. unc. 1, lin. 5; mandib. lin. 5.

Hab. Port Natal.

Allied to *C. faber*, Thomson, but is at once distinguished by its larger size and less glabrous character; it differs further in having the mandibles somewhat less curved, the sides of the prothorax straighter, and the absence of the small spine at the posterior angle. It belongs to that section of the African species of *Cladognathus* remarkable for the falcate form of the mandibles (which in fully-developed males are only armed at the apex), and in having the head furnished behind the eyes with a small obtuse tooth.

The female, as is frequently the case in other allied species of this genus, is more polished than the male, and has considerable affinity to the ♀ of *C. quadridens*, Hope, Cat. p. 14.

With the exception of a small species of *Dorcus*, *D. adspersus*, Boheman, recently described and figured by Professor Westwood (Trans. Ent. Soc., 3rd Ser., i. 435, pl. xvi. fig. 6), this is the only species of Lucanoid Coleoptera received in the numerous collections that have of late been transmitted to us from that rich entomological district of Africa, Port Natal. It appears in some of the continental cabinets under the manuscript name of *C. Vescoi.*

Cladognathus Spencii ♂, var. max., Hope, Tr. Linn. Soc. xviii. 589.

Macrognathus Spencii, Hope, Cat., p. 6.

bulbosus ♂, var. min., Hope.

The above insect, unique in the Hopeian Cabinet, was captured with other interesting species by W. Griffith, Esq., F.L.S., in the Assam district, and placed by the Rev. F. W. Hope in his Catalogue together with *Lucanus bulbosus* (also described in Tr. Linn. Soc. xviii. 589), in the sub-genus *Macrognathus*, immediately preceding the sub-genus *Platyprosopus*, both of which sub-genera appertain to the family *Dorcidæ*, and are respectively identical with the genera *Hemisodorcus* and *Eurytrachelus* of Mr. Thomson's "Catalogue of the Lucanidæ." *L. bulbosus*, Hope, a not very

uncommon species, has very properly been removed by Mr. Thomson to the genus *Cladognathus*, to which, from its general structure, it has evidently a much nearer affinity, and, as regards the other species, *L. Spencii*, the typical example of which is now before me, there appears to be but little doubt as to its being the var. max. of *L. bulbosus*, its chief characteristic consisting in a greater development of the mandibles and head, the former being considerably longer than the latter, arcuate, forked at the tip, and exhibiting in a slight degree only at their base the peculiar bulbose structure of the minor form, but still sufficiently apparent to trace the affinity.

Individuals of the var. max., or those presenting an extreme development of the mandibles, are but of rare occurrence among their respective species; and as regards *C. bulbosus*, of which numerous specimens have fallen under my notice, the present case is the only one I have met with. The name of one of our most celebrated Entomologists has been maintained, not only in right of priority of publication, but also in deference to his memory.

Gen. Homoderus, Parry.

Corpus subrotundatum, robustum. Clypeus transversus, bidentatus, antice leviter emarginatus. Mandibulæ capite vix longiores, falcatæ. Caput magnum, transversum, antice depressum, infra oculos armatum. Antennarum clava 4-articulata, scaphus elongatus. Prothorax lateribus pone medium (in utroque sexu) sinuatis et spina acuta armatis; angulis anticis rotundatis, posticis emarginatis. Pedes graciles. Tibiæ posticæ in maribus inermes.

Homoderus Mellyi, Parry, Proc. Ent. Soc. 1862, p. 107; Trans. Ent. Soc. 3rd Ser. i. 437, pl. xvi. f. 7 & 8. (Pl. XI. fig. 6.)

Mas.—H. fulvo-testaceus; mandibulis gracilibus, intus ad basin unidentatis et supra pone medium spinis nodosis tribus aut quatuor irregulariter armatis; capite sublente confertissime granuloso, supra oculos plagâ nigrâ notato; prothorace maculis quatuor nigris, transversim positis, in medio subtiliter longitudinaliter canaliculato; elytris lævissimis.

Long. corp. (mandib. incl.) fere unc. 2.

Hab. Afric. Occ. (Guinea, Old Calabar). In Mus. Parry, Mniszech et Murray.

Fœm.—H. nigro-fuscus; mandibulis gracilibus, brevibus, rugoso-punctatis, et dente parvo apicem versus instructis; capite

irregulariter et fortiter rugoso-punctato; clypeo parvo, rotundato; prothorace luteo, maculis quatuor nigris transversim positis, duabus medianis magnis, antice connexis, lateralibus parvis, rotundatis; elytris singulis vittâ lutescenti flavâ ab humeris ad apicem notatis; pedibus nigris, femoribus supra flavo-rufo maculatis; tibiis anticis paulo curvatis, extus irregulariter tribus vel quatuor spinis minimis instructis, intermediis posticisque unidentatis.

Long. corp. (mandib. incl.) unc. 1.

In a former communication to the Society, I mentioned the affinity of this insect with *Mesotopus Tarandus:* subsequent investigation, however, leads me to place it near *Cladognathus*, and to refer it more particularly to the African species *C. faber*, *C. Natalensis* and *C. modestus*. It resembles these in having the head broad and armed behind the eyes; the mandibles slender and falcate; the legs likewise slender; the anterior tibiæ of the females slightly curved and not dilated as in *Mesotopus*, and the posterior tibiæ of the males unarmed.

Nevertheless, the wide and strongly produced emarginate clypeus, the short, broad form and polished fulvous colour of the elytra, as well as the sinuated character of the sides of the prothorax in both sexes, amply justify the creation of the genus proposed, which may be placed after *Cladognathus*.

This new and interesting insect was kindly presented to me by Mrs. Melly, and was unique in the magnificent collection of the late Andrew Melly, Esq., of Liverpool, to whose memory I have dedicated it. Another specimen has recently been received by Andrew Murray, Esq., from Old Calabar.

Cyclommatus metallifer, Boisd.

Lucanus metallifer, Boisd. Voy. Astrolabe, pl. vi. fig. 20.
Cyclommatus æneomicans, Parry, Proc. Ent. Soc., 1862, p. 111.

Mas.—C. glabratus, fulvo-æneo nitens, sublente punctatus; clypeo concavo, triangulari; capite emarginato, sub vertice depresso, supra oculos angulato; mandibulis falcatis, subdepressis, capite thoraceque paulo longioribus, denticulis parvis plurimis subapicalibus intus armatis; elytris subparallelis; femoribus supra fulvo-striatis; tibiis inermibus.

Long. corp. unc. 1; mandib. lin. 4½.

Fœm.—C. fusco-brunneus, rugoso-punctatus, æneo-tinctus, subtus æneus; mandibulis brevibus, infra et supra unidentatis; clypeo parvo, rotundato; prothorace transverso, lateribus

posticis emarginatis; elytris elongatis, subparallelis; femoribus supra ut in maribus fulvo-striatis; tibiis quatuor posticis unidentatis.

Long. corp. (mandib. incl.) lin. 10.

Hab. Batchian ♂, ♀. Coll. Wallace.

Since the publication of my description above referred to, I have ascertained that *C. æneomicans* is but a minor variety of *L. metallifer*, Boisd. (loc. cit.), the type specimen of which is in the Museum of the Jardin des Plantes; the female, however, had not previously been described. With reference to the armature of the tibiæ of the females in this genus, Mr. Hope was evidently in error in characterizing them as having the four posterior unarmed (vid. Cat. p. 5); the contrary is found to be invariably the case, each of them being provided with a single spine.

Cyclommatus Maitlandi ♂, Parry (♀ ignota).
(Pl. XII. fig. 4.)

C. purpureo-æneus, sparse cinereo-squamosus; capite maximo; antennis pedibusque nigris; mandibulis incurvatis, ad basim unidentatis, apicibus furcatis, denticulis 3 vel 4 instructis.

Long. corp. unc. 1, lin. 2; mandib. lin. 7.

Hab. Ins. Nias, (Sumatræ occid.)

Specimen unicum. Mus. Soc. Zool. Amstelod.

The extraordinary size of the head of this species, in comparison with the prothorax and body, is most remarkable; in this respect it somewhat resembles *C. faunicolor*, Hope (vid. Tr. Ent. Soc. iv. 273), but differs from it and all the other species of the genus by its rich dark purple colour.

For the description and figure of this new species I am indebted to Mr. Maitland, the obliging Curator of the Zoological Society's establishment at Amsterdam; it forms part of a very interesting collection of Coleoptera I recently had the pleasure of inspecting under his kind auspices.

Cyclommatus affinis ♂, Parry (var. med., ♀ ignota).

C. æneo-rufescens, squamulis griseis sparsim tectus; elytris pedibusque fulvescentibus; capite magno, antice depresso, emarginato; mandibulis capite dimidio longioribus, falcatis, apicibus serratis, basi intus dilatatis, processu quadrinodoso armatis, dente minuto medio alioque majori acuto ante apicem instructis; prothorace lateribus pone medium angu-

latis; tibiis simplicibus, femoribus piceis; antennis tarsisque nigris; corpore subtus purpureo-æneo-tincto.

Long. corp. unc. 1; mandib. lin. 5.

Hab. Borneo et Ins. Philippinis.

Allied to both *C. Tarandus*, Thunb., and *C. Mniszechii*, Thoms. (comparing specimens of similar development); from the former it is at once distinguished by the pale chestnut and non-æneous colour of the elytra, which are somewhat broader and shorter, and, further, by the totally different armature of the mandibles; from the latter by its larger head, and shorter and less convex elytra; and, finally, from both by being clothed with griseous scales, in which it assimilates with *C. Dehaanii*, Westw. I must, however, remark that the sparse distribution of the scales in the specimen described is probably attributable to attrition. There is an insect in the British Museum from the Philippine Islands to be referred to this species.

Cyclommatus insignis ♂, Parry (var. med., ♀ ignota), Proc. Ent. Soc. 1862, p. 111.

C. fusco- vel rufo-æneus, supra et infra griseo-squamosus; capite supra triangulariter depresso, margine antico deflexo; clypeo parvo, conico; mandibulis capite paulo longioribus, denticulis parvis subapicalibus intus armatis, et prope basin denticulo binodoso instructis; prothorace capite angustiori, lateribus infra in medio angulatis; elytris subparallelis, regulariter quadricostatis, humeris subproductis; tibiis anticis obsolete unidentatis, posticis inermibus.

Long. corp. lin. 10; mandib. lin. 4.

Hab. Oriente.

This insect belongs to the second section of the genus, which may be characterized as "griseo-squamose;" it approximates somewhat in general appearance to *C. Dehaanii*, Westwood, from which, however, the peculiar sculpture of the elytra, as well as the armature of the mandibles, readily distinguish it.

Cyclorasis Jekelii ♂, Parry (var. max.). (Pl. IX. fig. 4.)

C. subparallelus, supra olivaceo-viridis, subtus nigro-piceo-æneus, dense punctulatus; mandibulis porrectis, capite paulo longioribus, lateribus interne excavatis, serrato-dentatis, apicibus recurvis, acute bifurcatis; capite antice emarginato, ante oculos angulato, acuto, producto; prothorace transverso-quadrato, lateribus fere rectis, angulis posticis fortiter emarginatis; elytris prothorace paulo angustioribus; antennis

pedibusque piceo-æneis; tibiis anticis 4-5-dentatis, intermediis medio dente acuto armatis, posticis inermibus.

Long. corp. unc. 1; mandib. lin. 3.

Hab. Chowsan (Corea).

This interesting new species is allied to *C. platycephalus*, Hope (vid. Westw. Or. Ent. p. 17, pl. viii. fig. 2), but is abundantly distinct; it differs in the form of its mandibles (which in *C. platycephalus* are of a peculiar structure, and described by Professor Westwood as being short and palmated), and in its elongate narrow elytra, which are also more strongly punctured. The ♀, as in *C. platycephalus*, is of a darker colour than the ♂, and, compared with the same sex of that species, presents the following differences: the head is broader, with the vertex depressed, more sparsely punctuate, the angle in front of the eye more produced, the two nodose elevations on the centre being entirely wanting; the prothorax is also wider and less punctate, and the elytra longer and less convex. The Rev. F. W. Hope in his Catalogue refers *C. platycephalus* to his sub-genus *Cyclophthalmus;* Mr. Thomson has, however, appropriately made it the type of his new genus *Cyclorasis*, whereof we are now acquainted with three distinct species. The above insect originally formed part of Mr. J. C. Bowring's rich collection, and has been named after M. Jekel, the well known author of a Catalogue of the *Curculionidæ*.

Cyclorasis subnitens ♂, Parry (♀ ignota), Proc. Ent. Soc. 1862, p. 112. (Pl. VII. fig. 1.)

C. glaberrimus, cinnamomeus, minute punctulatus; mandibulis brevibus, subrecurvis, intus obtuse 6 vel 7-denticulatis, apicibus subfurcatis; capite supra oculos angulato.

Long. corp. (mandib. incl.) lin. 9.

Hab. Ind. Or. Coll. Parry.

Of an elongate form, the elytra being much longer than the head, thorax and mandibles taken together; shining, of a polished cinnamon brown, with a faint brassy tinge. Mandibles short, recurved, forked at the tip with from 6 to 7 minute teeth on the inner edge. Head, thorax and elytra minutely punctured, lateral margins of prothorax slightly reflexed; scutellum blackish-brown. Tibiæ of fore legs crenulated externally, the four posterior unarmed.

Allied to *C. platycephalus*, but differs in the form of the mandibles, and in the anterior angles of the head being much less acute. The elytra are also narrower and more elongate.

Leptinopterus Fryi ♂, Parry (var. max., ♀ ignota). (Pl. VII. fig. 4.)

Psalidostomus Fryi, Parry, Proc. Ent. Soc. 1862, p. 112.

L. niger; thorace elytrisque pilis cinereis brevibus adspersis; capite antice subemarginato et elevato, supra oculos oblique truncato; mandibulis gracilibus, porrectis, leviter falcatis, intus irregulariter dentatis; prothorace transverso, antice angusto et dense aureo-fulvo ciliato, angulis posticis valde acutis; scutello pilis aureo-fulvis tecto; tibiis anticis tridentatis, posticis inermibus.

Long. corp. unc. 1, lin. 2; mandib. lin. 7.

Hab. Braz. Prov. Cantagallo (specimen unicum). Coll. Dom. Fry olim, nunc in Coll. Parry.

Black. Mandibles, head and prothorax somewhat shining; elytra dull, the left mandible with four teeth, the tips gradually incurved and pointed, the right mandible with three teeth only. Prothorax with two slight foveæ near the front margin and a slighter one behind on the median line, wider than the elytra, the sides extending obliquely outwards to the posterior angle, which is very prominent, the whole of the anterior margin and the middle of the posterior fringed with tawny golden hairs, extending in the latter over nearly the whole of the scutellum, the surface minutely punctured, more or less covered with short grey hairs. Elytra dull, minutely punctured, and also covered with short grey hairs; tip of elytra depressed, humeral angles prominent, and armed with an obtuse spine. Tibiæ with longitudinal lines of points, the anterior short, and armed with three teeth externally, and minutely serrulated towards the apex; the tarsi clothed beneath with golden hairs; the under-side of the prothorax fringed in front and behind with short, yellowish-rufous hairs.

In the great width and dilatation of the posterior angles of the prothorax, this insect approaches somewhat to the genus *Chiasognathus*. I am indebted to A. Fry, Esq., the possessor of a fine collection of Brazilian Coleoptera, for being enabled to give the description of it, and through his kindness it now forms part of my own collection.

Leptinopterus rotundatus ♂, Parry (♀ ignota). (Pl. VII. fig. 8.)

Psalidostomus rotundatus, Parry, Proc. Ent. Soc. 1862, p. 112.

Dorcus pachygnathus, MS. Mus. Berol.

L. ferrugineus, nigro-marginatus; capite magno, lateribus pone oculos unituberculatis; mandibulis brevibus, curvatis, api-

cibus furcatis, medio supra dente valido armatis ; prothorace capite latiori, angulis posticis obliquis ; elytris brevibus, paulo convexis ; tibiis anticis extus serrulatis, intermediis spina minuta armatis, posticis inermibus.

Long. corp. lin. 6 ; mandib. lin. fere 2.

Hab. Amer. merid. (Braz. ?). Coll. Mus. Berol. et Parry.

Of a dark ferruginous brown. Head, prothorax, lateral margins and suture of the elytra blackish ; head wide, emarginate in front, armed behind the eyes with a small spine ; mandibles short, but thick, hollowed on the inside, a little longer than the head, rounded on the underside, forked at the tip, and furnished in the centre, above, with a stout erect tooth. Elytra minutely punctate, narrowly black at the base, very convex. Scutellum blackish-brown ; femora pale ferruginous, tips black, tibiæ also blackish, those of the fore legs toothed and denticulated ; the intermediate tibiæ with a single spine, the posterior unarmed.

I am indebted to the late Dr. Klug for the specimen I possess. The insect is in the Museum of Berlin under the MS. name of *Dorcus pachygnathus*.

Macrocrates Bucephalus ♂, Burm. (Pl. X. fig. 9.)
♀ Dohrn, Ent. Zeit. 1862, p. 135.

A description of the ♀ of the above species has only lately been published by the well-known Entomologist Herr Dohrn of Stettin ; there is a single specimen (the only one, I believe, in this country) in the Hopeian Collection at Oxford, with the name of (*nigripes*, Dej. Cat.) attached to it. This specimen having belonged to the collection of Mons. Gory, it is reasonable to suppose the synonymy to be correct, more especially as Count Dejean places the species in the genus *Psalicerus*, a genus closely allied to *Macrocrates*. Mr. Thomson, in his Catalogue, refers however *P. nigripes*, Dej., to *P. morio*, Burm.

Hemisodorcus Passaloides, Hope. (Pl. X. fig. 4 ♂.)
Dorcus passaloides, Hope, Cat. pp. 6, 24 ♀.

H. (var. minor ♂) angustus, subparallelus, rufo-piceo obscurus ; mandibulis capitis longitudine, interne regulariter 4-dentatis, apicibus acutis ; clypeo transverso, 4-dentato ; capite prothoraceque sparse et grosse punctatis ; prothorace lateribus rectis, nec sinuatis, angulis anticis rotundatis, posticis obliquis ; elytris angustis, subparallelis, crebre fortiterque punc-

tatis; tibiis anticis extus 4 vel 5-dentatis, quatuor posticis spina minuta instructis.

Long corp. (mandib. incl.) lin. 9¼.

Hab. Borneo et Java.

Although no mention of the sex is made in the Rev. Mr. Hope's description of this species, it proves upon examination of the type-specimen to represent the female. Whether the given habitat of Java is correct admits perhaps of some doubt, as specimens of both sexes have lately been received from Borneo, and no other specimen from Java has ever fallen under my notice; it may, however, notwithstanding be indigenous to both islands. The male is now for the first time described and figured.

In general form and structure of its mandibles, this species assimilates somewhat to *Eurytrachelus*, differing however in its narrow subparallel form, and in having the lateral margins non-sinuate; in this respect being more in accordance with *Hemisodorcus*, Thoms., in which for the present it is located, with (*Cladognathus*) *gracilis*, Saund., and *piceipennis*, Westw.

Gen. Ditomoderus,* Parry.

Corpus latum, depressum, elytris politis. Caput transversum, antice late emarginatum, in medio tuberculo conico armatum, lateribus pone oculos haud rotundato-dilatatis. Oculi cantho dimidiatim incisi. Clypeus parvus, deflexus, subquadratus, antice rotundatus, leviter concavus. Antennæ breves, clava 4-articulata. Mandibulæ elongatæ depressæ, ad basin fortiter dilatatæ; dente valido obtuso prope basin marginis interni, tuberculo parvo pone medium, alteroque subapicali, apice ipso intus subito curvato. Prothorax latus, lateribus rotundato-dilatatis, suprà profunde longitudinaliter sulcatis, marginibus simplicibus. Tibiæ anticæ extus multi-serratæ; quatuor posticæ in medio denticulo unico armatæ.

Genus *Eurytrachelo* affine.

Ditomoderus mirabilis ♂, Parry. (Pl. XII. fig. 6.)

D. niger; capite, prothorace, mandibulisque tenuissime granulosis, subopacis; elytris nigro-castaneis, glabris, nitidis, lateribus punctatissimis, punctis rufo-setulosis; jugulo prope basin menti punctis duobus profundis impresso; mandibulis porrectis, depressis, capitis prothoracisque longitudine, interne ad basin dente magno obtuso reflexo armatis, ante

* Δίς, τέμος, δέρη; in allusion to the two deep longitudinal incisions on the lateral margins of the prothorax.

medium spina minima alteraque pone apicem instructis; clypeo angusto, deflexo; capite magno, transverso, antice emarginato, clypeo in medio supra tuberculato; prothorace transverso, capite elytrisque multo latiori, lateribus profunde sulcatis, angulis anticis rotundatis (nec sinuatis ut in gen. *Eurytrachelo*), posticis obliquis, medio leviter longitudinaliter canaliculatis; elytris subtiliter punctulatis, lateribus squamulis cinereis tectis; tibiis anticis irregulariter denticulatis, 4 posticis spina minima instructis; corpore subtus, femoribus, tibiis, tarsisque plus minusve squamulosis.

Long. corp. unc. 1, lin. 7; mandib. lin. 8.

Hab. Borneo. Coll. Wallace et Parry.

For the figure of this species, and the following remarks, I am indebted to Prof. Westwood.*

[This curious insect differs so much from the other groups of *Lucanidæ* as to have rendered necessary the establishment of a new genus (a sub-genus) for its reception. Whilst in general aspect it bears a strong resemblance to the large flat Indian *Platyprosopi*, &c., it differs from them all in the 4-jointed clava of its antennæ and dilated sides of the prothorax; from *P. Antæus*, Hope, &c., it is distinguished by the structure of the anterior emarginate part of the head, and the peculiar denticulation of the flattened mandibles. From *Odontolabis* (*L. Rafflesii*, Hope, &c.) it differs in having a spine in the middle of each of the middle and posterior tibiæ.

Pl. XII. fig. 6. The insect of the natural size; 6*a*, the clypeus and central tubercle of the front of the head; 6*b*, the eye half divided by the canthus; 6*c*, terminal joints of the antennæ; 6*d*, maxilla; 6*e*, mentum and palpi.—J. O. W.]

Eurytrachelus Tityus, Hope, Tr. Ent. Soc. iv. 74.
E. Chevrolatii, Thoms. Ann. Soc. Ent. Fr. 1862, p. 308.
semirugosus (var. minor), ib. 422.

The present species was described from a specimen then unique in my own collection by the Rev. F. W. Hope, in a paper read to the Society in the year 1842, upon several new species of Coleoptera from the Kasyah Hills collected by Dr. Cantor, and until a very recent period did not form part of the Hopeian Collection; hence the species was not recorded in Mr. Hope's Catalogue of Lucanidæ. It has, however, been received of later years somewhat abundantly in collections forwarded from the above-named district of India.

* See note *; *ante*, p. 17.

Upon a recent visit to several of the chief collections of Coleoptera on the continent, I ascertained that *Dorcus Tityus* was there represented as being the *D. Chevrolatii*, Hope, Ann. Nat. Hist. xii. 364, and Cat. pp. 20 and 6; this is evidently erroneous, the type of *D. Chevrolatii*, which is now before me, proving to be a var. max. of *Dorcus Saiga*, Olivier. There ought to be no mistaking the two species, according to the description of the mandibles of *D. Chevrolatii*, "arcuatis, in medio intus lato dente armatis, et pone hunc setosis" (vid. Cat. p. 20). This last character is not alluded to in the description of *D. Tityus;* it most decidedly does not exist in the insect itself, and is peculiar to *D. Saiga*, *D. cribriceps*, Chevr., and *D. purpurascens*, Voll., all three species belonging to the genus *Eurytrachelus* of Mr. Thomson.

Having examined the type specimen of *E. semirugosus*, Thomson, Cat. p. 422, I have no hesitation in regarding it as the var. min. of *E. Tityus*.

EURYTRACHELUS THOMSONI ♂, Parry.

E. niger, tenuiter granulatus, subopacus, depressus; capite lato transverso, antice depresso, emarginato, tenuissime granuloso, pone oculos inflato; mandibulis intus ad basin excisis, capite duplo longioribus, gracilibus, leviter curvatis, spinis duabus parvis obtusis, una ad basin alteraque prope medium instructis; clypeo prominulo, transverso, antice emarginato, obtuse bidentato; prothorace transverso, capite latiori, lateribus pone angulos anticos sinuatis, angulis posticis obtusis, lineâ mediâ longitudinali lævi notato; elytris dorso lævissimo, prothorace angustioribus, disco nitido, sublente punctulato, lateribus subtilissime coriaceis, subopacis, angulis humeralibus productis; tibiis brevibus, anticis extus irregulariter denticulatis, quatuor posticis inermibus.

Long. corp. lin. 13; mandib. lin. 6.

Hab. Ins. Molucc.

The present species was collected by Mr. Wallace, and is allied to *E. Ceramensis*, Thomson (vid. Cat. p. 424), but which is probably identical with *D. concolor*, Blanchard. The general colour of *E. Thomsoni* is of a somewhat polished black (and not, as in *Ceramensis* and *concolor*, rufo-piceous), with the disc of the elytra remarkably shining, contrasting strongly with the remainder of the insect; whereas, in the allied species alluded to, the colour of the insect is uniform, the sculpture being granulose and opaque. The tibiæ appear also to be shorter, with the tarsi more slender; the

clypeus is of a totally different form, being considerably broader and more deeply emarginate; and, finally, the mandibles interiorly are strongly excised at their base. I have much pleasure in dedicating this species to James Thomson, Esq., of Paris, the well-known American entomologist.

Eurytrachelus (Dorcus) Axis ♂, Dej. Cat. p. 193 (var. minor).
Lucanus Bucephalus ♂, Perty, Col. Ind. Or. 36, pl. i. fig. 5. (var. max.)

Through the kindness of Mr. James Thomson, who has placed at my disposal for examination several interesting types of species belonging to the late Count Dejean's Collection, as well as of others lately described by himself in the Catalogue of Lucanidæ and forming part of his own rich collection, I am enabled to clear up many points of interest with reference to the synonymy of certain species. As regards *D. Axis* ♂, there can be no doubt, as already noted by Dr. Burmeister (vid. Handb. v. 385), that it is the var. minor of *D. Bucephalus* ♂, Perty, also from Java; but I do not feel disposed to agree with M. Reiche (vid. Ann. Soc. Ent. Fr. Ser. 3, i. 79) as to its identity with *D. eurycephalus*, Burm. Handb. v. 387, the description of the following characters in the latter species exhibiting such a marked difference from *D. Axis* as to render the identity of the two species most improbable. They are as follows:—the mandibles are described as forked at the apex, and armed interiorly with two to three teeth placed at separate intervals, the interior sides clothed partially with a thick silky pubescence (as in *E. Saiga*), and the antennæ want the two slender hairy filaments preceding the clava, which are prominently to be recognized in *D. Axis*, *Titan*, *Saiga* and other species of this group.

M. Reiche (*ubi sup.*) is probably correct in regarding *D. eurycephalus*, Burm., as identical with *L. Bubalus*, Perty. This latter species is referred to by Burmeister as the var. min. both of *D. Bucephalus* and of *D. Saiga* (vid. Handb. v. 385, 388). I have not seen the type specimens of either *Bubalus*, Perty, or *Eurycephalus*, Burm., and feel doubtful whether they are a distinct species, or only the var. min. of one of the allied species.

M. Reiche further states the ♀ of *D. Axis* to be *D. exaratus*, Dej. Coll. Count Dejean's specimen of the latter now belongs to Mr. Thomson's Collection, and was lately described by that gentleman in his Catalogue of Lucanidæ, p. 426; it is now before me, and is clearly identical with *Dorcus lineatopunctatus* ♀ of Mr. Hope's Collection, described in his Catalogue, p. 23;

but whether it may be regarded as a distinct or as the minor variety of an allied species appears to me uncertain, not being acquainted with a sufficient number of specimens to enable me to form any decided opinion for the present. I incline to regard it as the var. min. of *E. Tityus*, Hope.

Eurytrachelus Saiga.

Lucanus Saiga, Oliv. Ins. I. i. 29, 19, tab. v. fig. 18 (♂).
Dorcus Saiga, Burm. Handb. v. 387.
Lucanus inermis, Fab. Syst. El. ii. 251, 17 (♀? sec. Burm. l. c.).
Dorcus inermis, Hope, Cat. p. 6 (♀).

In reference to the citation of the *L. inermis* of Fabricius as synonymous with the present species, I would offer the following remarks, prefacing them with that author's description.

L. mandibulis exsertis, inermibus, capitis thoracisque lateribus punctatis.

Hab. Sumatra.

Statura et summa affinitas *L. parallelepipedi*, at mandibulæ inermes; caput punctatum; thorax dorso lævi nitido, lateribus punctatis; elytra subpunctata; corpus nigrum.

Dr. Burmeister is evidently of opinion that the species in question is a female, and belongs to the family *Dorcidæ*. The mandibles, however, are so distinctly described as "exsertis inermibus," and such a structure is so utterly at variance with the general character of the females of this family, which are invariably found to be provided with a small internal tooth on their mandibles, that considerable doubt arises whether Dr. Burmeister's opinion that the Fabrician *inermis* is the female of *D. Saiga*, Oliv., is correct. M. Reiche, in his critique upon Dr. Burmeister's work (vid. Ann. Soc. Ent. Fr. vol. i. Ser. 3, p. 80), holds a contrary opinion. The specimen in the Hopeian Collection was received from Mr. Westermann of Copenhagen as *inermis*, Fab., and proves upon examination to be identical with the female of *D. Saiga*, thus supporting Dr. Burmeister's conclusion. If the determination of the species by Mr. Westermann were founded upon an actual comparison with a specimen of it in the old Fabrician Collection (still existing, I believe, in the Museum at Copenhagen), it is manifest that the original description would be erroneous, as a small tooth is unquestionably present in the insect received from Copenhagen. It must, however, be remembered that Mr. M'Leay, in his Hor. Ent., cites *Luc. inermis*, Fab., as belonging to the genus *Ægus*, although no allusion to it

is made by Messrs. Hope, Burmeister or Reiche. In this respect I feel disposed to agree with Mr. M'Leay; and, although unable to determine the species, have placed it in the catalogue with the genus *Ægus*.

Dorcus Klugii ♂, Thomson, Cat. p. 424.

After a careful examination of a series of specimens of the above insect from Assam, I feel satisfied that it must be considered as the var. max. of *D. Dehaanii*, the ♂ and ♀ of which species were originally described by Mr. Hope in the Trans. Linn. Soc. vol. xix. p. 106; the latter name will therefore be retained. The punctate-striate character of the elytra in the females of the genus, of which the small undeveloped males partake, is strongly illustrated in *D. Dehaanii*. Some faint traces of this character are to be remarked in the var. max., described for the first time by Mr. J. Thomson.

Dorcus derelictus (♀?), Parry.

D. elongatus, niger, nitidus; capite inter oculos bituberculato; mandibulis obsolete unidentatis; elytris lævissimis, subparallelis; tibiis posterioribus extus subcurvatis, inermibus, intermediis unidentatis.

Long. corp. (mandib. incl.) unc. 1, lin. 5.

Hab. Ind. Or. Himalaya. Coll. Parry.

Elongate and narrow; mandibles shorter than the head, slightly curved, grooved above with a small tooth within near the apex. Head excavated and punctured in front, smooth behind; between the eyes are two very prominent conical tubercles. Clypeus prominent, triangularly emarginate. Prothorax and elytra of the same width, indistinctly but coarsely punctured on the sides. Scutellum triangular, sparsely punctate. The anterior and posterior tibiæ slightly curved, the latter unarmed.

While, on the one hand, the general form and tuberculated head of the only specimen of the present species which has hitherto come under my notice are almost essentially characteristic of the female sex appertaining to this genus, on the other hand, the slender anterior, and the unarmed posterior, tibiæ are so utterly anomalous, as to leave some doubt whether it be really a female, or a male with short undeveloped mandibles; an acquaintance with both sexes might perhaps remove it to the genus *Eurytrachelus;* for the present I have placed it with *Dorcus*.

Dorcus mazama ♂, Leconte, Proc. Acad. Nat. Science, Philadelp. 1861, p. 345.

Lucanus mazama, Id., Classification Coleopt. N. America, p. 120.

D. mazama ♂, nigro-piceus; capite punctato, thorace vix angustiore; mandibulis apice acutis, dente parvo medio armatis, thorace latitudine plus duplo breviore, postice angustiore, lateribus medio obtuse angulatis, angulis posticis rectis, disco modice versus latera sat dense punctato; elytris modice punctatis, subtiliter rugosis; tibiis anticis 4-dentatis, et dente superiori obsoleto munitis, tibiis posterioribus dentibus 3 lateralibus apicalique acutis armatis.

Long. (mandib. excl.) unc. 1·20.

Hab. N. Mexico. In Mus. Dom. Leconte.

Dorcus? luteus, Westw., Tr. Ent. Soc., N. S., iii. 218, pl. xii. fig. 4.

The above named insect was described by Professor Westwood from the collection of the Rev. F. W. Hope, who obtained it from that of M. Gory, with the habitat of New Holland. If the specimen I lately inspected in the Hopeian Museum at Oxford is the insect in question, and I have but little doubt of its being the original type, it must be quite evident that some confusion has arisen with reference to the locality, as I believe it to be identical with *Ægus cicatrosus* ♀, of Wiedemann, a not uncommon insect from Java, which is the female of *Ægus acuminatus* of Fabricius.

Gnaphaloryx dilaticollis ♂, Parry.

G. nigro-piceus, opacus, squamulis griseo-luteis vestitus; capite magno, transverso, lateribus pone oculos dente obtuso armatis; clypeo transverso, late emarginato; mandibulis capitis longitudine, gracilibus, leviter curvatis, pone medium tuberculo obtuso suberecto, et denticulo minuto deflexo armatis, apicibus acutis; prothorace transverso, capite elytrisque multo latiori, basim versus angustato, medio longitudinaliter canaliculato, angulis anticis prominulis, rotundatis, posticisque oblique truncatis, lateribus fere rectis; elytris elongatis, subconvexis, costis 10 elevatis, interstitiis planis; corpore subtus squamoso; tibiis anticis minute tuberculatis, quatuor posticis inermibus.

Hab. Archip. Ind.?

Long. corp. (mandib. incl.) lin. 11. Coll. Parry. Specimen unicum.

Allied to *G. squalidus*, Hope, but readily distinguished from that species by its more elongate and convex form, its broader prothorax, with the anterior angles more produced, and by the strongly marked costate sculpture of its elytra. Its true habitat is uncertain, but I believe it to be from the Indian Archipelago.

GNAPHALORYX SCULPTIPENNIS ♂, Parry.

G. niger, opacus, squamulis griseis erectis dense vestitus; capite transverso, prothorace paulo angustiori, angulis posticis acutis; mandibulis capite paulo brevioribus, inermibus, apice falcatis, intus ad basin dilatatis, edentatis; prothorace transverso, medio obsolete longitudinaliter canaliculato, lateribus fere rectis, angulis posticis oblique truncatis; elytris brevibus, apicem versus convexis, fortius sed irregulariter costatis, interstitiis dense et minute punctatis; corpore subtus nigro, leviter squamuloso; pedibus piceis, hirsutis; tibiis inermibus.

Long. corp. (mandib. incl.) lin. 8.

Hab. N. Guinea. Coll. Mus. Lugdun. et Parry.

From the short unarmed mandibles, the above species may possibly represent only a var. minor; in more fully developed individuals, the mandibles, as in all the species of this genus, will probably be found to be denticulated; in all other characters it evidently belongs to this genus. I am indebted to Professor Dehaan, of Leyden, for its possession.

ÆGUS CICATRICOSUS, Wiedemann, Zool. Mag. II. i. 108 (*Lucanus*).

From the description of this species there is no doubt (although no allusion is made to the sex) of its representing a ♀, and there is further every reason to suppose that Dr. Burmeister is correct in referring it to *Æg. acuminatus*, Fabricius. Count Dejean, in his Catalogue, regards it as a distinct species, and M. Reiche takes the same view (vid. Ann. Soc. Ent. Ser. 3, vol. i. p. 82), stating both sexes to be in Count Dejean's Collection, but I am not aware upon what ground M. Reiche supposes the ♂ to which he alludes to be that of *cicatricosus* of Wiedemann, considering that one sex only is described by that author, and that, as already stated, is evidently the ♀.

I have now before me the typical specimen of Count Dejean's Collection (belonging to Mr. James Thomson); it is the var. minor of *Ægus chelifer*, M'Leay, from the Malay Peninsula.

The locality of Java assigned to Count Dejean's specimen is, I I have no doubt, erroneous; I am acquainted with many large

collections possessing long series of the various species of *Ægus* from Java, but I have never yet detected *Ægus chelifer* of M'Leay as coming from that island.

Ægus lunatus, Weber, Obs. Ent. i. 83, 1. (Luc.). Sumatra.
Fab. Syst. El. ii. 252, 19. Sumatra.
Burm. Handb. der Ent. v. 400. Sumatra and Java.

As regards the descriptions of Weber and Fabricius of this insect, their extreme conciseness precludes the possibility of recognizing with any certainty the species alluded to, the habitat Sumatra being given by both authors; Dr. Burmeister, l. c., records the species as distinct, from Java as well as from Sumatra, placing it next *acuminatus* of Fabricius, which belongs to that section of *Ægus* having the head in front (in fully developed males) armed with a tubercle; according to Dr. Burmeister's description, this character does not exist, and the insect in question must be considered as an undeveloped male, but whether to be referred to *Ægus acuminatus* of Fabricius or to be considered as a distinct species is, I think, somewhat problematical. The extraordinary variation of character exhibited in a series of specimens of the same species in this genus renders it most perplexing to recognize with any certitude their identity from description only.

Ægus Kandiensis, Hope, Cat. p. 6.

The type specimen in the Hopeian Collection (♂ var. minor) is referred by Mr. Hope in his Catalogue as a variety of *Æ. cicatricosus*, Wiedemann. (The insect in Mr. Hope's Collection under the name of *cicatricosus*, Wiedemann, appears to be only the var. minor of *acuminatus*, Fabricius.) Having examined a numerous series of the various developments of this insect from Ceylon, as well as others closely allied to it from the Philippines and Borneo, I find so much affinity existing in general character with such a perplexing variability of sculpture, that it is almost impossible to arrive at any definite conclusion as to whether the specimens from Ceylon, Borneo and the Philippines are to be considered as geographical varieties of *Æg. acuminatus* of Fabricius, or to be regarded as distinct to be united under the name of *Kandiensis*. There is certainly one character to be remarked in the numerous specimens examined, viz., that the interior tooth of the mandibles (which appears to exist in all fully developed males of this section of the genus) is placed slightly above the centre and not near the base as in *Æg. acuminatus;* in this respect

it accords with *Æg. chelifer* (var. max.), but is readily distinguished from this species by the strong and coarsely punctured lateral margins of the elytra. Under the circumstances I have united the Ceylon, Philippine and Bornean insects under the name of *Kandiensis*, Hope.

ÆGUS CHELIFER, M'Leay, Hor. Ent. i. 113.

A specimen of this insect is in the British Museum, received from Mr. M'Leay, with the habitat of Australia on the label; I have always had considerable doubt as to the locality, no other recorded specimen from that continent having ever fallen under my notice; and I am now convinced that the habitat given is erroneous, for the insect has recently been received with its various developments by Count Mniszech and myself, both from Cambodia and the Malay Peninsula,* and proves upon comparison to be identical with Mr. M'Leay's species in the British Museum.

The insect described by Mr. M'Leay evidently represents the var. minor of the species, but specimens of the var. max. have been received from the localities above stated, possessing the tuberculated front to the head as noticed in *Æg. acuminatus* (in minor developed specimens this process totally disappears), the mandibles being also armed in their interior with a tooth, but placed invariably slightly above the centre and not near the base as in *acuminatus;* the sides of the elytra are also apparently smooth, whereas in the var. max. of *acuminatus* they are strongly punctate. Allusion has been already made (*ante*, p. 52) to the identity of this species with *Ægus cicatricosus* ♂ of Mr. Thomson's Collection (olim Dejean), and to the uncertainty, as mentioned in Dejean's Catalogue, of Java being its true locality.

The insect in the Faune de l'Ile de Woodlark, p. 27, under the name of *Ægus chelifer*?, M'Leay, probably represents the var. minor either of *Æg. insipidus*, Thomson, or of *platyodon*, Parry, both species having been recently received rather abundantly from New Guinea and Celebes.

ÆGUS LABILIS, Westw. (Pl. XII. fig. 5.)

[*Dorcus labilis*, Westw.†

Æ. latus, depressus, niger, capite et pronoto subopacis, elytris glabris, striato-punctatis; capite antice in medio emarginato,

* *Nigidius cornutus*, M'Leay, stated to be from Australia, has been received also from the now mentioned localities. *Vide post*, p. 63.

† See note* *ante*, p. 17.

angulis acutis; mandibulis capite dimidio longioribus, dente parvo interno basali, altero magno paulo pone medium oblique porrecto, armatis; capitis disco versus angulos anticos obtuse bituberculato, maxillarum lobo valde elongato.

Long. corp. lin. 15½; mandib. lin. 6; prothoracis latitudo, lin. 7.

Habitat in India orient. septentr., Darjeeling. Mus. Parry.

The general colour is black, the elytra alone having a slightly pitchy tinge. The head and pronotum are very delicately granulose, and consequently subopaque; the elytra glossy, with rather deep striæ formed of confluent punctures. The head and pronotum especially are much flattened. The fore margin of the former is rather deeply emarginate in the middle, the emargination terminating in a produced point at each end, beyond which the front of the head is nearly straight, the lateral angles rounded off, the canthus cutting the eye into two parts (fig. 5*a*), and the sides of the head behind the eyes slightly produced into a rounded tubercle; between the eye and the frontal spine is, on each side, a small rounded but very slightly raised tubercle on the disc of the head. The clypeus is quite simple in the middle; the mandibles are half an inch in length, they are armed near the base on the inner edge with a small conical tooth, and rather beyond the middle with a strong tooth porrected obliquely forwards. The mentum is very broad and short, deeply emarginate in the middle, where it is depressed so as to meet the depressed centre of the clypeus and close the mouth in front; the sides, however, are sufficiently open to allow the extraordinarily developed outer flattened lobe of the maxillæ to lie exposed on the underside of the base of the mandibles, figure 5*c* representing the mentum with the exposed lobes of the two maxillæ, the maxillary palpi and the terminal joint of the labial palpi in situ; whilst fig. 5*d* represents the labium and labial palpi detached from the inner side of the mentum, the palpi even here being of unusual elongation. This structure I have observed in no other Lucanideous insect to such an extent as here occurs. The antennæ have the 7th joint produced into a point on the inner edge and armed with a bristle; the three terminal joints are short and broad. The disc of the head behind the eyes and along the posterior margin is finely punctured; the prothorax is wider than the head, the lateral margins nearly parallel, armed near the anterior angles with a small prominent angular projection; the sides, as well as the anterior and posterior margins, are strongly punctured; in the middle is a slightly impressed and punctured space, and within each of the

posterior angles is an oval polished patch. The elytra and scutellum are punctured at the base; the former are punctate-striate, the 2nd and 7th, 3rd and 4th, and also the 5th and 6th striæ being united at their extremities. The anterior tibiæ are serrated along the outer margin, with two strong teeth at the apex; the middle tibiæ are armed with two spines, and the posterior ones with a single spine in the middle of the outer edge.

This species is most nearly allied to *Dorcus capitatus*,* Westw. (Trans. Ent. Soc. iv. 275), but differs from the large males of that species in the much-advanced position of the strong tooth of the mandibles, and in the very slight development of the tubercle on each side of the disc of the head before the eyes; agreeing in this respect with *D. parallelus*, Hope (Cat. Lucan.), from the Khasyah Hills, whilst Major Parry's insect is from Darjeeling. The *D. parallelus* is indeed considered by Major Parry to be a small variety of *D. capitatus;* but the latter is from Malacca and Prince of Wales' Island, and I should be inclined to regard *D. parallelus* rather as the varietas minor of *D. labilis*. *D. sinister* (Hope, Cat. Lucan.), also from Prince of Wales' Island, is, doubtless, the female of *D. capitatus*, as Major Parry suggests. I have also scarcely any doubt that the female insect named *D. Malabaricus* (Hope, MS.; Westw. Trans. Ent. Soc. iv. 276) is identical with *D. sinister;* and in like manner I also consider that *D. æqualis* (Hope, MS.; Westw. Trans. Ent. Soc. iv. 276) is most probably identical with *D. parallelus*.

D. labilis is also closely allied to *D. Eschscholtzii*, Hope, but that is a considerably smaller insect, with a more polished upper surface, the anterior lateral angles of the head destitute of tubercles, and the pronotum destitute of the punctured impression in the middle.

Pl. XII. fig. 5. The insect of the natural size; 5*a*, the eye entirely divided by the canthus; 5*b*, maxilla; 5*c*, the mentum, lobes of maxillæ and palpi; 5*d*, labium and its palpi.—J. O. W.]

Ægus platyodon ♂, Parry (var. max.) (Pl. X. fig. 1.)

Æ. niger, parum nitidus; mandibulis falcatis, ad basin dente magno trifido armatis; capite magno, transverso, antice in medio profunde emarginato; elytris punctato-striatis; scutello sparsim et fortiter punctato; tibiis anticis serratis denticulis

* In the description and figure of this species in the 4th volume of these Transactions, the middle tibiæ are described as possessing only a single spine on the outer edge. They, however, agree in this respect with *D. labilis*.

6 aut 7 armatis, intermediis 4—5, posticisque 2 spinis minimis instructis.

Long. corp. lin. 13 ; mandib. lin. 4.

Hab. Ins. Gilolo. Coll. Wallace, Saunders, Parry.

Mandibles falcate, broad at the base, within which is a large tridentate process, and thence gradually narrowed to the tip. Head broad, slightly depressed, deeply emarginate in front; the angles of the emargination acute and obliquely prominent, and, like the mandibles, delicately shagreened, with indistinct scattered punctures, which are somewhat coarser on the sides and behind the eyes. Prothorax smooth anteriorly; the sides and hinder margin with coarse punctures ; lateral margins straight ; posterior angles much rounded. Scutellum shining, with a few deep punctures. Elytra with the shoulders acutely angular; base and lateral margins with deep punctures ; dorsal surface depressed, each with eight deep, longitudinal, punctate striæ ; the interstices sparsely and obsoletely punctate. Head, prothorax and abdomen coarsely punctured beneath.

This species, like all others of this genus, varies considerably in size, and the remarkable tridentate process at the base of the mandibles is entirely wanting in those of a minor development.

ÆGUS BLANDUS ♂, Parry.

Æ. subparallelus, niger ; labro parvo, bidentato ; capite magno, antice emarginato, subtilissime granulato, opaco, postice nitido, pone oculos in spina obtusa producto, et fortius confluenter punctato ; mandibulis capite brevioribus, arcuatis, spina obtusa prope basin armatis ; prothorace transverso, nitido, sub disco sparse punctulato, lateribus rectis, ruguloso-punctatis, angulis posticis obliquis ; elytris nitidis, striatis, interstitiis planis, lateribus punctulatis ad apicem attenuatis; tibiis anticis 4 vel 5 spinis armatis, intermediis unidentatis, posticis inermibus ; corpore subtus punctulatis ; pedibus tarsisque infra plus minusve ciliatis.

Long. corp. lin. 10 ; mandib. lin. $2\frac{3}{4}$.

Hab. Ins. Salwatty, N. Guinea.

There is but little doubt, from the shortness of the mandibles in comparison with the size and general appearance of the insect, that the former have not in the present instance attained their full development, and that in other specimens they will probably be found to be of a different character. In the female the mandibles are armed in the middle with a triangular tooth ; the head and prothorax deeply and coarsely punctured, the anterior tibiæ being strongly dilated towards the apex.

ÆGUS PUNCTIPENNIS ♂, Parry (var. max.)

Æ. nitidus, capite magno, depresso, parce fortiterque punctato, antice emarginato; mandibulis falcatis, capite haud longioribus, intus prope basin dente valido armatis; prothorace transverso, nitido, tenuissime punctulato, in medio longitudinaliter impresso; elytris striatis, crebre profundeque punctatis.

Long. corp. lin. 13; mandib. lin. 3.

Hab. Borneo. Coll. Wallace et Parry.

The above new species is allied to *Ægus platyodon* (*ante*, p. 56), differing, however, in the head being much more depressed in front, and in the elytra being strongly and coarsely punctate. It appears somewhat rare, the only specimens I am acquainted with being in the collections alluded to.

ÆGUS SERRATUS ♂, Parry (var. max.) (Pl. V. fig. 1.)

Æ. niger, nitidus, subdepressus, capite antice emarginato, bituberculato, subtiliter punctulato; mandibulis capite paulo longioribus, falcatis, intus ad basin dente magno deflexo armatis, paulo pone medium tuberculis duobus armatis; prothorace fere lævigato; elytris punctato-striatis.

Long. corp. (mandib. incl.) lin. 11.

Hab. Ins. Morty. Coll. Wallace et Parry.

Black and shining. Head deeply emarginate in front, minutely and sparsely punctate, with a deepish fovea in front of the eye. Mandibles slender, armed at the base with a strong obtuse deflexed tooth, followed by two small tubercles; in front of these is a deep sinus. The prothorax is somewhat broader than the head, shining, very minutely punctured, the punctures more apparent towards the sides, which are straight, the posterior angles being obliquely truncate. The elytra scarcely as broad as the prothorax, with 6—7 longitudinal striæ, faintly punctate, the interstices being smooth; humeral angles very prominent. Anterior tibiæ armed with 5 spines, intermediate with 2, posterior unarmed. Body beneath thickly and coarsely punctate.

ÆGUS IMPRESSICOLLIS ♂, ♀, Parry. (Pl. V. fig. 3.)

Æ. piceo-brunneus, depressus; prothorace elytrorumque lateribus et sutura squamulis cinereis tectis; mandibulis gracilibus, falcatis, supra sulcatis, rugulosis, grosse punctatis, ad basin processu emarginato, et prope apicem dente minuto armatis; capite transverso, confertim ruguloso, antice leviter

emarginato, lateribus pone oculos productis, punctatis; elytris prothorace angustioribus, lævibus, punctato-striatis ad basin, suturâ lateribusque punctatis; tibiis anticis extus irregulariter denticulatis, quatuor posticis unispinosis.

Long. corp. lin. 7; mandib. lin. 3.

Hab. Malacca et Borneo. Coll. Mniszech et Parry.

The female, which in colour and depressed form resembles the male, differs from that sex in having the interstices of the elytra thickly and strongly punctate. As is the case in the other species of this genus, the armature of the mandibles is subject to considerable variation; in small male specimens the subapical tooth is entirely wanting.

ÆGUS GLABER ♂, Parry (var. minor?).

Æ. angustus, rufo-piceus, nitidus; capite antice vix emarginato, depresso, parce subtiliterque punctulato; mandibulis capite paulo longioribus, arcuatis, apicibus acutis, intus ad basin dente parvo armatis; prothorace transverso, lateribus cum angulis posticis rotundatis, subtilissime punctato; elytris prothorace triplo fere longioribus, leviter punctato-striatis, interstitiis planis, lateribus dense punctatis, parce pilosis; pedibus rufo-castaneis; tibiis anticis dilatatis, extus 3 vel 4-denticulatis, quatuor posticis inermibus.

Long. corp. (mandib. incl.) lin. $5\frac{1}{2}$.

Hab. N. Guinea. Coll. Parry.

One of the minor species of the genus, remarkable for its smooth and polished appearance, and allied to *Ægus myrmidon*, Thomson, from which species it differs, however, in its more parallel and convex form, in the anterior part of the head being scarcely emarginate, in the rounded sides of the prothorax, and in the more delicate striation of its elytra.

ÆGUS? TRILOBATUS ♂, Parry. (Pl. VII. fig. 7.)

Æ. nigro-fuscus; capite, prothorace, elytrorumque marginibus, fusco-ferrugineis, hirsutis; mandibulis brevibus, gracilibus, intus ad basin unidentatis; capite obscure punctato, lateribus pone oculos emarginatis; prothorace capite latiori, rude punctato, lateribus singulariter trilobatis; elytris ovalibus, in medio latioribus, nitidis, profunde striatis, apice subproducto; pedibus hirsutis; tibiis anticis minute denticulatis, posticisque inermibus.

Long. corp. (mandib. incl.) lin. 6.

Hab. Borneo. Coll. Parry.

A single ♂ specimen of this interesting new species was received from Sarawak, Borneo, and is provisionally placed with the genus *Ægus*, differing, however, in the short convex character of the elytra, and more especially in the singular trilobate lateral margins of the prothorax. A knowledge of the other sex of this species might possibly throw some light as to whether it might be regarded as the type of a new genus.

Platycerus Caucasicus ♂, Parry.

P. cæruleus, nitidus; capite parcius punctato, antrorsum profunde emarginato, impresso; mandibulis elongatis, capitis fere longitudine, curvatis, supra sulcatis, extus prope basin angulatis, intus ad basin dente obtuso parvo instructis; prothorace transverso, angulis anticis prominulis, deflexis, lateribus sinuatis, angulis posticis obtusis, parcius sat fortiter punctato; elytris elongatis, parallelis, punctatis, leviter lineatis; corpore subtus nigro; tibiis anticis minute denticulatis, quatuor posticis inermibus.

Long. corp. (mandib. incl.) lin. 6½.

Hab. in Caucaso. Coll. Mniszech et Parry.

Readily distinguished from its European ally, *P. Caraboides*, by its narrower and more convex form, its prominent and more slender mandibles, its impressed and sparsely punctate head, the sinuate lateral margins of the prothorax, the obtuse posterior angles and punctuation of that segment, and, finally, by its more parallel and sparsely punctate elytra, the interstices being smooth.

Platycerus cærulescens ♂, Leconte, Proc. Acad. Nat. Science, Philadelph. 1861, p. 345.

P. cærulescens ♂, niger; capite thoraceque parce grosse punctatis, hoc transverso, lateribus antice rectis, paulo convergentibus, pone medium inflexis, angulis posticis obtusis, haud rotundatis; elytris nigro-cyaneis, punctis striatim digestis, interstitiis irregulariter subseriatim punctatis; mandibulis sursum incurvis, dente interno pone apicem alteroque superno armatis.

Long. (mandib. incl.) unc. ·48.

Hab. California. In Mus. Dom. Leconte.

Platycerus Agassii ♀, Leconte, Proc. Acad. Nat. Science, Philadelph. 1861, p. 345.

P. Agassii ♀, elongato-ovalis, supra obscure æneus; capite thoraceque sat dense punctatis, hoc linea dorsali lævi, latitu-

dine duplo breviori, lateribus fortiter marginatis, valde rotundatis, angulis posticis rectis, prominulis; elytris obsolete striatis, striis punctatis, interstitiis rugosis, confuse punctatis; tibiis posticis denticulo externo ad medium armatis.

Long. unc. ·38.

Hab. California. Dom. Agassiz.

In the publication above alluded to the author states this species to be closely related to *Platycerus depressus*, Leconte, with which species *P. Oregonensis*, Westwood, is perhaps identical.

Sclerostomus Fairmairii ♂, ♀, Parry.

S. depressus, supra atro-cæruleus, parum nitidus; prothorace elytrisque vitta lutescente marginatis, parce grosseque punctatis; mandibulis nigris, capitis fere longitudine, ad basin processu quadrinodoso productis; capite pone oculos minute tuberculato; prothorace disco in medio impressione magna ovali, lateribus depressis; elytris apice acutis, sparse grosseque punctatis, humeris productis; pedibus nigris; tibiis anticis irregulariter denticulatis, 4 posticis in medio unispinosis; tarsis subtus setosis; corpore infra nigro, crebre punctato.

Long. corp. (mandib. incl.) lin. 9.

Hab. Chili.

I am indebted to M. Fairmaire for the addition of this new species (of which I have also seen a specimen in the collection of Alexander Fry, Esq.) to my cabinet; it is allied to *S. femoralis*, Guérin, but at once distinguished from it by its more depressed and less punctate elytra and less rounded apex of those organs, the more clearly defined and narrower longitudinal pale yellow lateral vitta above mentioned, and, finally, by the legs being black instead of rufous. The female, as is usual in this genus, differs in having short, coarsely punctate mandibles (which, in the present instance, appear to be totally unarmed), and in the minute size and strong punctuation of the head.

[Sclerostomus Philippi ♂, ♀ (Parry, MS.) Westw.*(Pl. XI. fig. 5.)

S. niger; pronoto et elytris subnitidis fasciaque pallide flavo-squamosa marginatis; capite antice concavo, utrinque inter et ante oculos carina modice elevata obliqua instructo; mandibulis (♂) capitis longitudine, lunatis, apice ovato-dilatatis, denteque magno plano trifido intus versus basin armatis;

* See note *, *ante*, p. 17.

prothorace lateribus parallelis, margine laterali ad basin oblique punctato; clypeo transverso, disco late impresso (et in medio punctato), antice tuberculo conico medio armato; elytris modice convexis, punctatis, et obsolete longitudinaliter canaliculatis.

♀ mari simillima, at mandibulis parvis simplicibus et prothorace parum minori distincta.

Long. corp. maris cum mandibulis lin. 7.

Habitat in Chili. In Mus. D. Parry.

This new species differs from *Scl. Lessonii*, Buquet (Ann. Soc. Ent. Fr. = *Pycnosiphorus mandibularis*, Solier, Gay Nat. Hist. Chili), in its uniform black colour, in the elytra being destitute of the numerous elevated polished spots between the punctures, the prothorax not widened in front, the head narrower, the clypeus not porrected into a rounded lobe in the middle, the crown of the head wanting the auriculated process on each side between the eyes, and in the different shape of the mandibles. The prothorax has a deep central channel, terminated in the middle of the fore margin in a small conical point. The underside of the body is glossy, with a few minute punctures, the head, including the mentum, being more strongly and closely punctured. The fore tibiæ have six teeth on the outer edge, and the four posterior tibiæ are each armed with two spines on the outer margin.—J. O. W.]

Gen. Oönotus,* Parry.

Dorcus adspersus, Boheman, Ins. Caffr. 2, 384.

Dorcus adspersus, Westw. Tr. Ent. Soc. Ser. 3, i. 435, pl. xvi. fig. 6.

A description and figure of the above species (from Port Natal), by Professor Westwood, will be found in the Transactions of the Society (l. c.) It appears, upon examination, to be so very aberrant in general form and character from those insects belonging to *Dorcus* proper, that I have no hesitation in proposing it as the type of a new genus; but as we are only acquainted with the female sex, it is unadvisable for the present to give any decided characters; nevertheless the short mandibles, the abbreviate and convex form, the squamose texture of the body, with its rounded and anteriorly trituberculate prothorax, sufficiently warrant the creation of the proposed new genus. The above characters distinguish the insect from those smaller species of the *Dorcidæ* appertaining to the genera *Sclerostomus* and

* Ὠόν, νῶτος, in allusion to the convex back.

Lissotes. This insect appears to represent, on the southern coast of Africa, those species from S. America and N. Holland belonging to the genera above alluded to.

Lissotes Menalcas, Westw.

This species appears to form the connecting link, through the genus *Nigidius*, between the *Dorcidæ* and *Figulidæ*.

L. Howittanus, Westw., exhibits a marked difference from *L. Menalcas* in the character of the prothorax; but its similarity to that species in other respects, and its close affinity in appearance to *Nigidius*, have induced me to locate it for the present at the end of the genus *Lissotes*, immediately preceding the *Figulidæ*.

Nigidius cornutus ♂, ♀, M'Leay, Hor. Ent. i. p. 109.

N. cornutus, ater, nitidus; mandibulis tridentatis; clypeo punctato, antice mucronato; elytris inter strias elevatis, triplici punctorum impressorum ordine instructis, apicibus punctatis; tibiis anticis 7-dentatis.

♂ mandibularum margine supero et externo in ramum cornutum producto.

♀ mandibulis brevioribus, haud cornu supero instructis.

A second description of this species will be found in the Entomological Magazine, vol. v. p. 264, by Prof. Westwood, taken from a specimen in the British Museum, stated to have been received from Mr. M'Leay, and from Australia. Having long doubted the accuracy of this habitat, no specimens of it being contained in the numerous collections of Australian Coleoptera which have reached this country, I have only recently ascertained the true habitat of the species in question, specimens in the collections of W. W. Saunders, Esq., and of Count Mniszech, from Cambodia and Malacca, proving, upon comparison, to be identical with that in the British Museum.

Nigidius obesus ♂, Parry.

N. convexus, brevis, nigerrimus, nitidus; capite utrinque infra oculos auriculato; mandibulis subrecurvis, intus ad basin processu bifido productis, extus pone medium dente parvo obtuso armatis; prothorace crebre grosseque punctato, in medio obsolete late longitudinaliter caniculato, angulis anticis simplicibus; elytris brevibus, convexis, rugoso-punctatis, fortiter sulcatis, interstitiis lævibus.

Hab. Penang, Malacca.

Long. corp. (mandib. incl.) lin. 7½.

This species is readily distinguished by its short, robust and convex form, and by the absence of the minute tubercle in the centre of the anterior margin of the prothorax which characterizes most of the allied species. The number of external spines on the tibiæ appears to be most variable in this genus; no instance, however, being known to me in which they are entirely wanting.

Penichrolucanus copricephalus, H. Deyrolle, Ann. Soc. Ent. Fr. Ser. iv. vol. 3, p. 485; pl. ix. fig. 11, and details.

The aberrant characters exhibited in this singular insect from Malacca (vid. l. c.), recently described from a unique specimen in Count Mniszech's Collection, preclude the possibility of assigning, with any degree of certainty, its true position in the *Lucanoidea*. It is even, I believe, still a matter of doubt among many Entomologists whether the species in question ought to be referred at all to this division of the Coleoptera. I have nevertheless placed it temporarily near *Figulus*, bearing, as it does, some similarity to the species of that genus, and equally, perhaps, also to the genera *Nigidius* and *Agnus*, the latter appearing to form the passage between *Nigidius* and *Figulus*.

Figulus vulneratus, Thomson, Cat. p. 433.

The type specimen of the above-named species from Madagascar has obligingly been communicated to me for examination by Mr. Thomson. It appears to me to be specifically identical with *F. anthracinus*, Klug (vid. Ins. v. Madagasc. 85, n. 116), differing only in the confused position of the punctures forming in the normal state the dorsal striæ by which the elytra are characterized. Mr. Thomson (p. 402) appears to be of the same opinion with Dr. Burmeister as to this species being synonymous with *Fig. sublævis* of Palissot de Beauvois, from Africa, and noticed by Professor Westwood, as a distinct species, in the Ent. Mag. v. 262, sp. 3. If the several specimens received from Senegal, Guinea and Bassan are identical with Palissot's insect, it is very evident, upon comparison with the Madagascar species, that the two are distinct.

Figulus scaritiformis ♂, Parry (var. minor).

F. scaritiformis, Parry, Proc. Ent. Soc. 1862, p. 113.

F. parvulus, rufo-piceus; capite grosse punctato; prothorace lævigato, lateribus vage et rude punctato, medio canaliculato,

canaliculo punctato; elytris profunde striatis, striis punctatis, apice subproducto.

Long. corp. (mandib. incl.) lin. $3\frac{1}{2}$.

Hab. Malacca. Coll. Parry.

The present briefly-described insect appears to be allied to *F. Manillarum*, Hope (*angustatus*, MS., Eschscholtz), and like that species varies considerably in sculpture according to development, rendering it difficult in a single description to characterize the different stages of its growth.

F. scaritiformis appears, however, to differ in having the elytra somewhat shorter and more depressed, the sides of the prothorax more coarsely punctate, and the central longitudinal channel longer and deeper, its punctuation also being more defined. Since my first notice of this species, several specimens of it, in the various stages of development, have been received from the same locality.

Sinodendron Americanum ♂, ♀, Palisot de Beauvois, Ins. Afric. et Amér. 192, tab. i. fig. 1, 2, 3; Melsheim. Cat. Coleop. U. S. p. 57.

S. piceum; thorace marginato, glabro, antice truncato, 7-dentato, intermedio duobusque lateralibus prominulis; capitis cornu recurvo; elytris valde et subirregulariter punctato-striatis.

Whether the description above quoted of an insect, stated to be from North America, can be considered as applying to a distinct species, admits perhaps of some doubt, no other specimen having been recorded from that country. Allusion is certainly made to it in Melsheimer's Catalogue of the United States Coleoptera, but on Palisot's authority alone.

Dr. Leconte also, in his Classification of the United States Coleoptera, mentions further that he is totally unacquainted with it. I feel, therefore, inclined to believe, from the description as well as from the great similarity of the figures given in Palisot's work to our own European species, that *Sinodendron cylindricum* has been erroneously described as a distinct species under the name of *S. Americanum*; but not being acquainted with the type specimen, the present remarks can only be taken therefore as conjecture.

Dendroblax Earlianus, White, Voy. Erebus and Terror, Zool. p. ix. pl. ii. fig. 9 ♂, 10 ♀.

The marked affinity shown in several respects by this species

to some of the sub-genera belonging to the *Dynastidæ*, and already alluded to by various authors, renders it somewhat perplexing to assign for it any satisfactory place among the Lucanoid Coleoptera.

Mr. White (l. c.) remarks that this insect approximates both to *Lamprima* and *Rhyssonotus*. Professor Westwood, in his notice of the species (vid. Tr. Ent. Soc., N. S., vol. 3, p. 213), regards it as an obscure representative of *Sphenognathus*, with the mouth of a *Sinodendron*, alluding at the same time to the female as being apterous; and, finally, Monsieur Lacordaire, in his invaluable work on the Genera of Coleoptera, to which I have already had such frequent occasion to allude, although placing it with the *Lamprimidæ*, mentions that from the remarkable character of its legs the species appears to be rather allied to the *Dynastidæ* than to the *Lucanidæ*. In this view I am disposed to coincide, but have nevertheless, under the circumstances, placed it provisionally at the end of my arrangement, immediately after the genus *Sinodendron*, thus establishing the connecting link between the Lucanoid Coleoptera and the *Dynastidæ*.

Note.—At one or two recent meetings of the Entomological Society, "dimorphism" or "polymorphism" has been the subject of discussion. This singular phenomenon is very marked in the Lucanoid Coleoptera; and the existence of diverse forms of the same species, often exhibiting differences in their structural characters, renders necessary an acquaintance with a series of varieties of each separate species before we can arrive at a correct classification of this interesting group.—F. J. S. P., May, 1864.

COLEOPTERORUM LUCANOIDUM CATALOGUS.

Fam. I. CHIASOGNATHIDÆ.

Genus 1. PHOLIDOTUS, M'Leay, Horæ Entom. i. 97 (1819).
Casignetus ♀, ib. 98.
Lamprima, Schönh. Syn. Ins. I. iii. 197 (Add.).
Chalcimon, Dalman, Ephemer. Entom. 1 (1824).

Sp. 1. P. Humboldti, [♂, ♀] Schönh. l. c. ..... Brasilia.
Dej. Cat. 193.
de Castelnau, Hist. Nat. Ins. ii. 169.
Westw. Ann. Sci. Nat. ser. 2, i. 119 (1834).
Burm. Handb. der Entom. v. 419 (1847).
Guérin, Icon. Règne Anim. 109, tab. xxvii. fig. 6.
lepidosus ♂, M'Leay, Hor. Entom. i. 97.
Brullé, Hist. Nat. Ins. 427, tab. xxvi. fig. 3.
geotrupoides ♀, M'Leay, Hor. Entom. i. 98.
Cuvier, Règne Anim. tab. xlv. fig. 5.

Sp. 2. P. Spixii, [♂, ♀] Perty, Delect. Anim. Artic. Braz. 54, tab. xi. fig. 13 (Chalcimon) ..... Brasilia.
Burm. Handb. v. 420.
Lacord. Gen. Coléop. iii. 12 (1856).
Dejeanii ♂, Buquet, Ann. Soc. Ent. Fr. t. x. Bullet. p. 21.

Genus 2. CHIASOGNATHUS, Ste. Trans. Phil. Soc. Camb. iv. tab. i., ii. (1831).
Orthognathus, Dej. Cat. 193.
Sphenognathus, Buquet, Rev. Zool. 1838, p. 104.
Tetraophthalmus, Lesson, Illustr. de Zool., tab. xxiv.

Sectio I.

Sp. 1. C. Grantii, [♂, ♀] Ste. l. c. ..... Chili et Ins. Chiloe.
Westw. Ann. Sci. Nat. 1834, p. 118.
,, Zool. Journ. No. 19, p. 392.
Sturm, Cat. Coleop. tab. iv. fig. 1, 2, ♂, ♀ (1843).
Burm. Handb. v. 339 (1847).
Gay, Hist. Chili, Zool. v. 41, Zool. Atlas, tab. xiii. fig. 1, 2, ♂, ♀ (1851).
Lacord. Gen. Coleop. iii. 12 (1856).
de Castelnau, Hist. Nat. Ins. ii. 170.
Reiche, Ann. Soc. Ent. Fr. 1850, p. 265.
Chilensis, Lesson, l. c. (Tetraophthalmus).

Sp. 2. C. Jousselinii, [♂] Reiche, Ann. Soc. Ent. Fr. 1850, p. 265 .... Chili.
,, Rev. Zool. 1850, p. 249.
Schaum, Bericht der Ent. 1850, p. 48.
Lacord. Gen. Coléop, iii. 13.

Sp. 3. C. Mniszechii, [♂, ♀] Thoms. Cat. Lucan., Ann. Soc. Ent. Fr. 1862, p. 406.....Chili.
Parry, *ante*, p. 6 (Tab. X. fig. 3).
♀ in Coll. Germain.

Sp. 4. C. Latreillei, [♂, ♀] Solier, Gay. Hist. Chili, v. 42 .....Chili.
Schaum, Bericht der Ent. 1851, p. 64.
Lacord. Gen. Coléop. iii. 13.
Reichii ♂, Thoms. Cat. Lucan. 407.
imberbis, Philippi et Dohrn, MS.

Sectio II.

Sp. 5. C. Feisthamelii, [♂, ♀] Guér. Mag. Zool. 1840, tab. xxxix... Colombia; Bolivia; N. Granada.
Guér. Dict. pittor. d'Hist. Nat. ix. 103.
Burm. Handb. v. 340 (Sphenognathus).

Sp. 6. C. Prionoides, [♂, ♀] Buquet, Guér. Mag. Zool. i. ser. 2, Ins. tab. i. .....Colombia; N. Granada.
Guér. Rev. Zool. 1838, p. 104.
Burm. Handb. v. 341 (Sphenognathus).
Lacord. Gen. Coléop. iii. 14, tab. xxv. fig. 1.
Dej. Cat. 193 (Orthognathus).

Sp. 7. C. Lindenii, [♂, ♀] Murray, Edinb. N. Ph. Journ. N. S. v. 221, tab. iii. fig. 1, 2. .....Quito.
Thoms. Cat. Lucan. 409 (Sphenognathus).

Sp. 8. C. Murrayi, [♂, ♀] Thoms. Cat. Lucan. 409 .....Venezuela.

Sp. 9. C. albofuscus, [♀] Blanchard, Ins. d'Amér. mérid. d'Orbigny, vi. 2, 193, tab. xii. fig. 7 (Orthognathus).....Peru.
In Mus. Jardin des Plantes, Parisiis (spec. unicum).

Genus 3. RHYSSONOTUS, M'Leay, Hor. Entom. i. 98 (1819).

Sp. 1. R. nebulosus, [♂, ♀] Kirby, Tr. Linn. Soc. xii. 411, tab. xxi. fig. 12 (Lucanus)..... Nov. Holland.
M'Leay, l. c.
Dej. Cat. 193.
Sturm, Cat. 345, tab. iii. fig. 9 ♂.
de Castelnau, Hist. Nat. Ins. ii. 170.
Cuvier, Règne Anim. tab. xlv. fig. 8.
Boisd. Faune de l'Océanie, 233.
Brullé, Hist. Nat. Ins. 428, tab. xxvi. fig. 4.
Burm. Handb. v. 336.
Lacord. Gen. Coléop. iii. 17.
foveolatus ♀, Thunb. ? (sec. Burm. l. c.).

Sp. 2. R. (?) jugularis, [♀?] Westw. Tr. Ent. Soc. 3rd Ser. i. 429, tab. xiv. fig. 1 .....Nov. Holl. (Victoria).

Genus 4. CACOSTOMUS, Newm. Mag. Nat. Hist. 1840, p. 364.
Lepidodes, Westw. Ann. Nat. Hist. viii. 124 (1841).

Sp. 1. C. SQUAMOSUS, [♂, ♀] Newm. l. c. ..... Nov. Holland.
Westw. Tr. Ent. Soc. N. S. iii. 211, tab. xi. fig. 6, 7.
Burm. Handb. v. 362.
Erichs. Wiegm. Archiv. 1842, ii. 234.
rotundicollis, Westw. l. c. (Lepidodes).
Thoms. Cat. Lucan. 392 (Lepidodus).

Genus 5. LAMPRIMA, Latr. Gen. Crust. et Ins. ii. 152.
,, Nouv. Dict. d'Hist. Nat. xvii. 277.
M'Leay, Hor. Ent. i. 99.
Reiche, Rev. Zool. 1841, p. 50.
Burm. Handb. v. 410.
Erichs. Wiegm. Archiv. 1842, p. 108.
de Castelnau, Hist. Nat. Ins. ii. 169.
Lacord. Gen. Coléop. iii. 17.

Sectio I.

Sp. 1. L. LATREILLII, [♂, ♀] M'Leay, Hor. Ent. i. 101 .... N. Holl. (Sydney).
de Castelnau, l. c.
Erichs. l. c.
Hope, Cat. Lucan. 1.
Burm. Handb. v. 411.
cuprea? Latr. Nouv. Dict. d'Hist. Nat. xvii. 279.
æneus (var. *cæruleus*), Donov. Ins. N. Holl. tab. i. (fig. inf. med.).
pygmæa, M'Leay, l. c.
puncticollis ♀, Dej. Cat. (vid. Boisd. Faune de l'Océanie, 231).
ænea, Boisd. Faune de l'Océanie, 228.
Tasmaniæ (var. min.), Hope, Cat. Lucan. 28.
amplicollis, Thoms. Cat. Lucan. 411.

Sp. 2. L. AURATA, [♂, ♀] Latr. Nouv. Dict. d'Hist. Nat. xvii. 278 .. Nov. Holl.
M'Leay, Hor. Ent. i. 100.
æneus, Donov. Ins. N. Holl. tab. i. (fig. dext. med.).
Schreibers, Tr. Linn. Soc. v. 187 (secundum M'Leay).
ænea, de Castelnau, Hist. Nat. Ins. ii. 169.
Guér. Icon. Règne Anim. 109, tab. xxvii. fig. 5.
Hope, Cat. Lucan. 1.
Schreibersii, Hope, Cat. Lucan. 1.
? *fulgida*, Boisd. Faune de l'Océanie, 231 ..... Ins. Waigiou.

Sp. 3. L. SPLENDENS, [♂, ♀] Erichs. Wiegm. Archiv. 1842, i. 108, 2.. Nov. Holl.
Burm. Handb. v. 413.
fulgida, Thoms. Cat. Lucan. 393.
An species distincta?

Sp. 4. L. RUTILANS, [♂, ♀] Erichs. Wiegm. Archiv. 1842, i. 170, 88 .. Tasmania.
Burm. Handb. v. 412.
Thoms. Cat. Lucan. 393.

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Sp. 5. L. ÆNEA, [♂, ♀] Fab. Syst. El. i. 2, 2 (1792, Lethrus)..Ins. Norfolk.
Schreibers, Tr. Linn. Soc. vi. 185, tab. xx. fig. 1 (1811, Lucanus).
Latr. Gen. Crust. et Ins. ii. 132 (1807).
,, Nouv. Dict. d'Hist. Nat. xvii. 278 (1817).
Schönh. Syn. Ins. I. iii. 328.
Burm. Handb. v. 414.
subrugosa, Hope, Cat. Lucan. pp. 1, 28.
viridis, Erichs. Wiegm. Archiv. 1842, i. 109 (vid. Reiche, Ann. Soc. Ent. Fr. Ser. 3, i. 83).

Sp. 6. L. MICARDI, [♂, ♀] Reiche, Rev. Zool. 1841, p. 51.. N. Holl. (Swan River).
Burm. Handb. v. 416.
Hope, Cat. Lucan. 1.
Erichs. Wiegm. Archiv. 1842, i. 108.
Thoms. Cat. Lucan. 393.
varians, Germ. (*sec.* Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 83).
cultridens, Burm. (*sec.* Reiche, l. c.)

Sp. 7. L. VARIANS, [♂, ♀] Germ. Linn. Ent. iii. 195....N. Holl. (Adelaide).
Burm. Handb. v. 415.

Sp. 8. L. SUMPTUOSA, [♂] Hope, Cat. Lucan. pp. 1, 28. N. Holl. (Swan River).
Parry, *ante*, p. 7.

Genus 6. STREPTOCERUS (Dej. Cat. 193), Fairmaire, Ann. Soc. Ent. Fr. 1850, p. 53.

Sp. 1. S. SPECIOSUS, [♂, ♀] Dej. Cat. 193 .....Chili.
Fairmaire, Ann. Soc. Ent. Fr. 1850, p. 53, tab. i. fig. 2.
Westw. Tr. Ent. Soc. N. S. iii. 204, tab. xi. fig. 1 ♀.
Lacord. Gen. Coléop. iii. 18.
Dejeanii, Solier, Gay. Hist. Chili, v. 44, tab. xv. fig. *c* ♂.

Genus 7. COLOPHON, Westw. Ann. Sc. Nat. i. ser. 2, p. 113 (1834).

Sp. 1. C. WESTWOODII, [♂] G. R. Gray, Griffiths' Anim. Kingd. Ins. 534, tab. xlvi. fig. 5 .....Afric. merid.
Westw. l. c. tab. vii. fig. 5.
,, Tr. Ent. Soc. N. S. iii. 197, tab. x. fig. 1.
Burm. Handb. v. 404.
Hope, Cat. Lucan. 6.
de Castelnau, Hist. Nat. Ins. ii. 173.
Lacord. Gen. Coléop. iii. 21.
lethroides, Westw. MS.

Sp. 2. C. THUNBERGII, [♂] Westw. Tr. Ent. Soc. N. S. iii. 198, tab. x. fig. 2 .....Caffraria?

Fam. II. LUCANIDÆ.

Genus 1. MESOTOPUS, Burm. Handb. v. 362.

Sp. 1. M. Tarandus ♂, Swed. Act. Holm. iii. 186, tab. viii. fig. 2 (1787) .....Sierra Leonum; Guinea.
Linn. Syst. Nat. (ed. Gmel.) iv. 1591.
Schönh. Syn. Ins. I. iii. 322.
Hope, Cat. Lucan. 4.
Burm. Handb. v. 363.
Lacord. Gen. Coléop. iii. 23.
♀, Parry, Proc. Ent. Soc. 1862, p. 107.
„ *ante*, p. 7. (Tab. V. fig. 4.)

Genus 2. LUCANUS, Scop. Faun. Carn. (1763).

Hexaphyllus, Mulsant, Ann. Soc. Agr. Lyon (1838).

Sectio 1.

Sp. 1. L. cervus, [♂, ♀] Linn. Syst. Nat. I. ii. 559, ed. 12 (Scarabæus).. Europa.
Fab. Syst. El. ii. 248, 3.
Gesner, Nat. Hist. of Beasts, &c., 1005, cum fig. (vid. *ante*, p. 8).
Schönh. Syn. Ins. I. iii. 318.
Kraatz, Berl. Ent. Zeitsch. 1860, pp. 68, 265, tab. vii.
Westw. Mod. Classif. Ins. i. 187.
Burm. Handb. v. 350.
Erichs. Naturg. Ins. Deutschl. iii. 936.
Lacord. Gen. Coléop. iii. 8.
Blanchard, Ann. Sci. Nat. Ser. 3, v. 322.
Duval, Gen. Coléop. d'Eur. iii. 7.
Bellier, Ann. Soc. Ent. Fr. 1846, Bulletin, p. 28, tab. ii. fig. 3.
capreolus, Fab. Syst. El. ii. 249, 5.
capra, Oliv. Ent. I. i. 11, tab. i. fig. 1, tab. ii. fig. 1.
Dorcas, Panz. Faun. Germ. ii. 58.
hircus, Herbst, Natursyst. Coleop. iii. 299, tab. xxxiii. fig. 4 ♂, fig. 5 ♀.
armiger, Herbst, Natursyst. Coleop. iii. 301, tab. xxxiv. fig. 1 ♂.
maxillaris, Motsch. Bull. Moscou, 1845, i. 60 (*sec.* Kraatz, l. c.)
Tauricus, „ „ „
pentaphyllus, Reiche, Ann. Soc. Ent. Fr. 1853, p. 71; Rev. Zool. 1856, p. 80.
Fabiani, Mulsant, Opusc. Ent. vi. 150 (*sec.* Kraatz).
Pontbrianti, Mulsant, Ann. Soc. Agr. Lyon, ii. 119, tab. xii.
Duval, Gen. Coléop. d'Eur. iii. 12.
Lusitanicus, Hope, Cat. Lucan. 9.
Americanus, „ „ 10.

Sp. 2. L. Tuncicus, [♂, ♀] Sturm, Cat. 346, tab. v. fig. 1 (1843).. Turcia; As. Min.; Græcia.
Duval, Gen. Coléop. d'Eur. iii. 10.
H. Deyrolle, Ann. Soc. Ent. Fr. 1860, Bulletin, p. 22.
Kraatz, Berl. Ent. Zeitsch. 1860, p. 273 (*L. cervi* var.)

Sp. 3. L. ORIENTALIS, [♂, ♀] Kraatz, Berl. Ent. Zeitsch. 1860, p. 273.. Turcia; Asia Min.
macrophyllus, Reiche (vid. Kraatz, lib. cit. p. 271) ..... Caramania.
tetraodon, Duval, Gen. Coléop. d'Eur. iii. 11....Asia Min.; Caucaso.
Ibericus? Motsch. Bull. Moscou, 1845, p. 60.
curtulus? ,, ,, ,,

Sp. 4. L. LATICORNIS, [♂] H. Deyrolle, MS. (vid. *ante*, p. 9) ..... Caucaso. In Coll. Mniszech et Parry.

Sp. 5. L. TETRAODON, [♂, ♀] Thunb. Mem. Soc. Nat. Moscou (1806) i. 188..... Italia; Sicilia; Corsica.
Barbarossa, Costa, Faun. Napol. pars i. tab. xvii.
Burm. Hand. v. 349.
serraticornis, Duval, Gen. Coléop. d'Eur. iii. 11.
Fairmaire, Ann. Soc. Ent. Fr. 1859, p. 275.
Corsicus, Gautier des Cottes, Ann. Soc. Ent. Fr. 1860, Bullet. p. 53.

Sp. 6. L. BARBAROSSA, [♂, ♀] Fab. Syst. El. ii. 251, 15.. Hispan.; Corsica; Afric. bor.
Duval, Gen. Coléop. d'Eur. iii. 13, tab. i. fig. 1 ♂, fig. 2 ♀.
Schönh. Syn. Ins. I. iii. 325.
Illig. Mag. ii. 233, 1, iv. 104, 15 (*sec.* Schönh.)
Thunb. Mem. Soc. Nat. Mosc. i. 201, 27 (*sec.* Schönh.)
? *Pontbrianti*, var. Mulsant, ubi sup. (vid. Gerst. Bericht der Ent. 1859—60, p. 110).

Sectio II.

Sp. 7. L. LUNIFER, [♂, ♀] Hope, Royle. Illustr. Nat. Hist. Himal. tab. i. fig. 4 ..... Ind. Himal.
Hope, Cat. Lucan. 9.
Lama, Burm. Handb. v. 353.
rugifrons, ♀, Hope, Cat. Lucan. 4.

Sp. 8. L. MEARESII, [♂, ♀] Hope, Ann. Nat. Hist. xii. 364. Ind. Himal.; Silhet.
,, Tr. Ent. Soc. iv. 73.
,, Cat. Lucan. 10.
Westw. Orient. Ent. 21, tab. x. fig. 1.
nigripes ♀, Hope, Cat. Lucan. 10.

Sp. 9. L. HOPEI, [♂] Parry, Proc. Ent. Soc. 1862, p. 103.. Ind. Or. aut Archip. Malay.
Parry, *ante*, p. 9 (Tab. VI. fig. 2).

Sp. 10. L. CANTORI, [♂, ♀] Hope, Ann. Nat. Hist. xii. 363 .....Ind. Or.
Hope, Cat. Lucan. 9.
,, Tr. Ent. Soc. iv. 73.

Sp. 11. L. VILLOSUS, [♂] Hope, Gray. Zool. Miscell. 1831, p. 22 .... Nepalia.
,, Cat. Lucan. 9.
Lama, Burm. Handb. v. 353.
lunifer, Thoms. Cat. Lucan. 393.

Sp. 12. L. SERICANS, [♂] Voll. Tijd. v. Ent. iv. 103 (1861) .....Japonia.
hircus? Sturm, Cat. 136 (vid. *ante*, p. 10).
Sp. sequentis var. min.?

Sp. 13. L. MACULIFEMORATUS, [♂, ♀] Motsch. Etudes Ent. 1861, p. 9..Japonia.

Sp. 14. L. VICINUS, [♂] Hope, Cat. Lucan. 10 .....Ind. Or. (Poonah).
Burm. Handb. v. 527.

Sp. 15. L. WESTERMANII, [♂, ♀] Hope, Cat. Lucan. 10 .....Assama.

Sp. 16. L. SMITHII, [♂] Parry, Proc. Ent. Soc. 1862, p. 108 .....Ind. Or.
Parry, *ante*, p. 10 (Tab. X. fig. 2).
Thoms. Cat. Lucan. 394.

Sp. 17. L. FORTUNEI, [♂, ♀] Saunders, Tr. Ent. Soc. N. S. iii. 46, tab.
iii. fig. 1 ♂, 2 ♀ .....China.

Sp. 18. L. ATRATUS, [♂] Hope, Gray. Zool. Miscell. 1831, p. 22 ....Nepalia.
,, Cat. Lucan. 10.

Sp. 19. L. ELAPHUS, [♂, ♀] Fab. Syst. El. ii. 249, 4 .....Amer. bor.
Oliv. Entom. I. i. 12, 4, tab. iii. fig. 7.
Thunb. Mem. Soc. Nat. Moscou, i. 191.
Schönh. Syn. Ins. I. iii. 322.
Burm. Handb. v. 354.
Melsheimer, Cat. Coleop. U. S. 57.
De Geer, Mem. iv. 33, 3 (*L. cervi* var.).
placidus ♀, Say, Journ. Acad. Philad. v. 202.

Sp. 20. L. CAPREOLUS, [♂, ♀] Linn. Mus. Lud. Ulr. 32, 30.....Amer. bor.
Linn. Syst. Nat. I. ii. 500, 2.
Oliv. Ent. I. i. 15, 8, tab. ii. fig. 4 ♂, tab. iii.
fig. 4 ♀.
Herbst, Col. iii. 302, tab. xxxiv. fig. 2 ♂,
fig. 3 ♀.
Panz. Ent. Beitr. i. 1, tab. i. fig. 1, 8.
De Geer, Ins. iv. 336, tab. xix. fig. 11, 12.
Schonh. Syn. Ins. I. iii. 323.
Hope, Cat. Lucan. 4.
Dama ♂, Fab. Syst. El. ii. 249, 6.
Thunb. Mem. Soc. Nat. Mosc. i. 198, 22.
Dej. Cat. 193.
de Castelnau, Hist. Nat. Ins. ii. 171.
Melsheimer, Cat. Coleop. U. S. 57.
trigonus? ♀, Thunb. lib. cit. 199, 24, tab. xii. fig. 4.
muticus? ♀ ,, ,, 205, 37.

Sp. 21. L. LENTUS, [♂, ♀] de Castelnau, Hist. Nat. Ins. ii. 171....Amer. bor.
Burm. Handb. v. 356.
Melsheimer, Cat. Coleop. U. S. 57.
rupicapra, Dej. Cat. 193.

Genus 3. RHÆTUS, Parry, *ante*, p. 10.

Sp. 1. R. WESTWOODII, [♂] Parry, Proc. Ent. Soc. 1862, p. 108 (Hexarthrius ?).....India vel Archip. Ind.
Parry, *ante*, p. 11 (Tab. IX. fig. 2, 8).

Genus 4. HEXARTHRIUS, Hope, Cat. Lucan. 4.
Cladognathus, Burm. Handb. v. 364.
Lucanus, Oliv. Ent. I. i. 21.

Sp. 1. H. FORSTERI, [♂, ♀] Hope, Tr. Linn. Soc. xviii. 587, tab. xl. fig. 1 .....Assama.
Hope, Cat. Lucan. 11.
Burm. Handb. v. 367.
serricollis ♀, Hope, Tr. Linn. Soc. xviii. 591.

Sp. 2. H. BOWRINGII, [♂] Parry, Proc. Ent. Soc. 1862, p. 108..
India vel Archip. Ind.
,, *ante*, p. 12 (Tab. IX. fig. 5, 7).

Sp. 3. H. RHINOCEROS, [♂, ♀] Oliv. Entom. I. i. 21, tab. v. fig. 21 ....Java.
Thunb. Mem. Soc. Nat. Mosc. i. 201.
Schönh. Syn. Ins. I. iii. 322.
Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 75.
Burm. Handb. v. 366.
falciger ♂ (var. med.), Hope, Cat. Lucan. 11.
longipennis ♀, Hope, Cat. Lucan. 10.
vitulus ♀, Dej. Cat. 193.
Hope, Tr. Ent. Soc. iv. 183.
Thoms. Cat. Lucan. 394.

Sp. 4. H. BUQUETII, [♂] Hope, Tr. Ent. Soc. iv. 182, tab. xiii. fig. 4....Java.
Rhinoceros, Burm. Handb. v. 366.

Sp. 5. H. CHAUDOIRI, [♂] H. Deyrolle, MS. (vid. *ante*, p. 11).....Sumatra.

Sp. 6. H. MNISZECHII, [♂] Thoms. Archiv. Entom. i. 396 .. Ind. Or. (Silhet).
Lacord. Gen. Coléop. tab. xxv. fig. 5.

Sp. 7. H. PARRYI, [♂, ♀] Hope, Tr. Linn. Soc. xix. 104, tab. x. fig. 2..Silhet.
Burm. Handb. v. 367.

Sp. 8. H. DEYROLLEI, [♂] Parry, *ante*, p. 11 (Tab. IV. fig. 1).....Siama.

Genus 5. ODONTOLABIS, Hope, Tr. Linn. Soc. xix. 105; Cat. Lucan. 5.
Anoplocnemus, Hope, Ann. Nat. Hist. xii. 364.
Calcodes, Westw. Ann. Sc. Nat. i. 118.

Sectio I.

Sp. 1. O. Vollenhovii, [♂] Parry, *ante*, p. 13 (Tab. VIII. fig. 1) ....Borneo.
Lacordairei, Parry, MS. (olim).

Sp. 2. O. Ludekingii, [♂, ♀] Voll. Tijd. v. Ent. iv. 104, tab. v. fig. 2..Sumatra.
Parry, *ante*, p. 13 (Tab. II. fig. 1).

Sp. 3. O. Wollastonii, [♂, ♀] Parry, *ante*, p. 14. .....Malacca.
(Tab. II. fig. 2, 3; tab. III. fig. 1).

Sp. 4. O. Mouhotii [♂], Parry, *ante*, p. 14 (Tab. I. fig. 1)..Cambodia; Siama.

Sp. 5. O. Lacordairei, [♂] Voll. Tijd. v. Ent. iv. 104, tab. v. fig. 1 (vid.
ante, p. 13) .....Sumatra.

Sp. 6. O. Burmeisteri, [♂] Hope, Tr. Ent. Soc. iii. 279, tab. xiii. fig. 3
(gen. *Anoplocnemi* typus)..Ind. (Mysore).
,, Cat. Lucan. 16.
,, Ann. Nat. Hist. viii. 302.
Sp. sequentis var.?

Sp. 7. O. Cuvera, [♂, ♀] Hope, Tr. Linn. Soc. xix. 105, tab. x. fig. 3..
Assama; Silhet.
Saundersii ♂ (var. min.), Hope, Tr. Linn. Soc. xix. 105.
Prinsepii ♂ (var. med.), Hope, Cat. Lucan. pp. 5, 16.
Westw. Or. Ent. tab. xxvi. fig. 5.
Delessertii ♂, ♀ (var. min.), Hope, Cat. Lucan. pp. 5, 16.
bicolor ♂ (var. min.), Saunders, Tr. Ent. Soc. ii. 177, tab. xvi.
fig. 3.
Burm. Handb. v. 360.
Gazella, Westw. Or. Ent. 54.

Sp. 8. O. Delessertii, [♂] Guérin, Souv. Voy. Deless. Ins. 48, tab. xii.
fig. 3 .....Ind. bor.; Neilgherries.
Chenu, Encycl. d'Hist. Nat. tab. introd. fig. 2.
Parry, Tr. Ent. Soc. ser. 3, i. 447.

Sp. 9. O. Gazella, [♂, ♀] Fab. Syst. El. ii. 250, 9; Ent. Syst. I. ii.
238; Mant. Ins. i. 1 .....Siama; China.
Linn. Syst. Nat. (ed. Gmelin) iv. 1589.
Herbst, Col. iii. 313, 12.
Westw. Or. Ent. 54, tab. xxvi. fig. 2, 3, 4.
Oliv. Ent. I. i. 13, tab. iv. fig. 13.
Thunb. Mem. Soc. Nat. Mosc. i. 195, 16.
bicolor, Burm. Handb. v. 360.

Sectio II.

Sp. 10. O. Dux, [♂, ♀], Westw. Ann. Nat. Hist. 1841, p. 154..Ins. Philippin.
Westw. Or. Ent. 17, tab. viii. fig. 1.
Cumingii, Hope, Cat. Lucan. pp. 5, 17.
Alces, Burm. Handb. v. 360.
Alces?, Petiv. Gazoph. tab. xlvii. fig. 15 (1702).

Sp. 11. O. carinatus, [♂, ♀] Linn. Mus. Lud. Ulr. 34 (Scarabæus)..
Ind. Or. (Silhet).
Schönh. Syn. Ins. I. iii. 323.
? Thunb. Mem. Soc. Nat. Moscou, i. 193, tab. xii. fig. 2.
Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 72.
Alces, Fab. Syst. Ent. i. 1.
Oliv. Entom. I. i. 8, tab. ii. fig. 3 *a*.
(var. min.) Burm. Handb. v. 359.
camelus (var. minor), Oliv. Entom. i. 22, tab. v. fig. 19.
Siva, Hope, Cat. Lucan. pp. 5, 16.

Sp. 12. O. bellicosus, [♂, ♀] de Castelnau, Hist. Nat. Ins. ii. 171, tab. xvi. fig. 1.....Java.
ursus ♀, de Castelnau, Hist. Nat. Ins. ii. 171, tab. xvi. fig. 2.
Vishnu (var. min.), Hope, Cat. Lucan. 17.
serrifer (var. min.), ,, ,,
Alces, Burm. Handb. v. 359.
emarginatus, Dej. Cat. 193.
Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 73.

Sp. 13. O. Dalmani, [♂, ♀] Hope, Cat. Lucan. pp. 5, 17..
Tenasserim; Borneo; Sumatra; Malacca.
Thoms. Cat. Lucan. 394.
pubescens ♂, Blanchard, MS.

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Sp. 14. O. Stevensii, [♂, ♀] Thoms. Cat. Lucan. 414 .....Celebes.
Parry (Tab. V. fig. 2, 5).

Sp. 15. O. Dejeanii, [♂, ♀] Reiche, Rev. Zool. 1852, p. 21, tab. i. fig. 4.....Singaporia; Borneo; Malacca.
Lama ♂, Dej. Cat. 193 (vid. Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 72; Thoms. Cat, Lucan. 395).
Styx ♂, Blanchard, MS.
latipennis ♀, Hope, Cat. Lucan. pp. 5, 17.

Sp. 16. O. Castelnaudi, [♂] Parry, Proc. Ent. Soc. 1862, p. 108....Sumatra.
,, *ante*, p. 14 (Tab. I. fig. 2).

Sp. 17. O. BICOLOR, [♂, ♀] Oliv. Entom. I. i. 22, tab. v. fig. 20.. Malacca; Borneo; Sumatra.
Thunb. Mem. Soc. Nat. Moscou, i. 204, 34.
Schönh. Syn. Ins. I. ii. 322.
Westw. Or. Ent. 53, tab. xxvi. fig. 1.
Burm. Handb. v. 360.

Sp. 18. O. BROOKEANUS, [♂, ♀] Voll. Tijd. v. Ent. iv. 107, tab. vi. fig. 1 (var. med.).....Borneo.
Parry, *ante*, p. 15 (Tab. VI. fig. 5, var. max.)

Sp. 19. O. SOMMERI, [♂] Parry, Proc. Ent. Soc. 1862, p. 108 .....Manilla.
,, *ante*, p. 16 (Tab. VI. fig. 4).

Sp. 20. O. STRIATUS, [♂, ♀] H. Deyrolle, MS. (vid. *ante*, p. 15)....Malacca.

Sp. 21. O. PLATYNOTUS ♀, Hope, Cat. Lucan. pp. 5, 18.....China.
emarginatus ♂, Saunders, Tr. Ent. Soc. N. S. iii. 49, tab. iii. fig. 4 ♂, fig. 5 ♂ var. min.
Evansii ♂, Westw. Tr. Ent. Soc. N. S. iii. 201, tab. x. fig. 5.

Sectio IV.

Sp. 22. O. CINGALENSIS, [♂, ♀] Parry, *ante*, p. 16 (Tab. X. fig. 8)..Taprobana.
Bengalensis, Tennant, Hist. Ceylon, i. 27, Cat. Coleop.

Sp. 23. O. NIGRITA, H. Deyrolle, MS. (vid. *ante*, p. 17) .....Taprobana.

Sp. 24. O. INTERMEDIUS, H. Deyrolle, MS. .....Taprobana.
Sp. nova, in Ann. Soc. Ent. Fr. 1864 descriptura.

Sp. 25. O. ÆRATUS ♂, Hope, Tr. Zool. Soc. i. 99, tab. xiv. fig. 2 ♂ var. min. (nec ♀)..
Tenasserim; Ins. Walliæ Principis; Malacca.
Hope, Cat. Lucan. pp. 5, 16.
Westw. Ann. Sci. Nat. i. 118 (Calcodes).
,, Or. Ent. 22, tab. x. fig. 6 (var. max.)
de Castelnau, Hist. Nat. Ins. ii. 172.
Burm. Handb. v. 361.
♀, Parry (Tab. VII. fig. 9).

Genus 6. HETEROCHTHES, Westw., *ante*, p. 17.

Sp. 1. H. BRACHYPTERUS, [♂, ♀] Westw., *ante*, p. 18 ....Cambodia; Siama.
(Tab. X. fig. 6 ♀, fig. 7 ♂; Tab. XI. fig. 1 ♂ var. max., fig. 2 ♂ var. min., fig. 3 ♀.)

Genus 7. NEOLUCANUS, Thoms. Cat. Lucan. 415.

Odontolabis, Hope, Tr. Linn. Soc. xix. 105; Cat. Lucan. 5.
Anoplocnemus, Burm. Handb. v. 357.
Anodontolabis, Parry, Tr. Ent. Soc. ser. 3, i. 447.

Sp. 1. N. Baladeva, [♂, ♀] Hope, Tr. Linn. Soc. xix. 105 .....Silhet.
Parry (Tab. IX. fig. 1, mandibulæ).
? *Lama*, Oliv. (vid. Parry, Tr. Ent. Soc. ser. 3, i. 453).
angulatus (var. min.), Hope, Cat. Lucan. 17.
bicolor, Burm. Handb. v. 360.

Sp. 2. N. Saundersii, [♂] Parry, *ante*, p. 20 (Tab. IX. fig. 3, mandib.)..Ind. Or.

Sp. 3. N. nitidus, [♂] Saunders, Tr. Ent. Soc. N. S. iii. 47, tab. iv. fig. 1..China.

Sp. 4. N. laticollis, [♂, ♀] Thunb. Mem. Soc. Nat. Mosc. i. 163 .... Java.
Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 80.
Thoms. Cat. Lucan. 395.
glabratus, Hope, Cat. Lucan. 18.
Dej. Cat. 193.

Sp. 5. N. castanopterus, [♂, ♀] Hope, Gray. Zool. Misc. 1831, p. 22..Nepalia.
,, Cat. Lucan. pp. 5, 18.
Westw. Or. Ent. 22, tab. x. fig. 5, ♂; tab. xxvi. fig. 6, ♀.
bicolor, Burm. Handb. v. 360.

Sp. 6. N. Sinicus, [♂, ♀] Saunders, Tr. Ent. Soc. N. S. iii. 48, tab. iv. fig. 2, 3 .....China.

Sp. 7. N. cingulatus, [♀] Parry, *ante*, p. 20 (Tab. IV. fig. 3).....Malacca.

Sp. 8. N. Championi, [♂] Parry, *ante*, p. 20 .....China.

Genus 8. CLADOGNATHUS, Burm. Handb. v. 364.
Macrognathus, Hope, Cat. Lucan. 5.
Metopodontus, ,, ,, 4.
Prosopocoilus, ,, ,, 4.
Psalidognathus, Motsch. Etudes Ent. 1861, p. 13.
Prismognathus, ,, Schrenck. Reise, Col. (1860), p. 138; Etudes Ent. 1861, p. 10.

Species Asiaticæ.

Sectio I.

Sp. 1. C. Giraffa, [♂, ♀] Fab. Syst. El. ii. 248 (Lucanus) ..Ind. Or., Java.
Oliv. Ent. I. i. 21, tab. v. fig. 16.
Thunb. Mem. Soc. Nat. Mosc. i. 189, 4.
Schönh. Syn. Ins. I. iii. 318.
Burm. Handb. v. 368.
Brahminus (♂ var. min.), Hope, Tr. Linn. Soc. xix. 106.
Giraffoides ,, Hope, MS.
Whithillii ,, Hope, MS.
? *Downesii* ♀, Hope, Cat. Lucan. 19.

Sp. 2. C. Confucius ♂, Hope, Ann. Nat. Hist. ii. 62; Cat. Lucan. 18..China.
? *Downesii* ♀, Hope, Cat. Lucan. 19.

Sp. 3. C. FORFICULA, [♂, ♀] Thoms. Rev. Zool. 1856, p. 327; Archiv. Ent. i. 488, tab. xiv. fig. 7 ♂, 8 ♀ .....China.

Sectio II.

Sp. 4. C. INCLINATUS, [♂, ♀] Motsch. Etudes Ent. 1857, p. 29 .....Japonia.
Motsch. Etudes Ent. 1861, p. 13 (Psalidognathus).
mandibularis, Thoms. Cat. Lucan. 417.

Sp. 5. C. CINNAMOMEUS, [♂, ♀] Guér. Ic. Règne Anim. Ins. tab. xxvii. fig. 3 (Lucanus) .....Java.
Burm. Handb. v. 372 (Cladognathus).
Chenu, Encycl. d'Hist. Nat. tab. x. fig. 3.
pallidipennis, Hope, Tr. Linn. Soc. xviii. 590 (Lucanus).
fulvipes ♂ (var. min.), Hope, Cat. Lucan. 13.
Rafflesii ♀, Hope, Proc. Ent. Soc. 1844, p. 106 (Lucanus).
Westw. Tr. Ent. Soc. iv. 274, tab. xx. fig. 2.

Sp. 6. C. CASTANEUS, [♂, ♀] Hope, Cat. Lucan. 12 .....India

Sp. 7. C. FOVEATUS, [♂, ♀] Hope, Tr. Linn. Soc. xviii. pars 4; Cat. Lucan. 12 .....Ind. Or., Assama.
omissus, ♂, ♀, Hope, Tr. Linn. Soc. xviii. pars 4; Cat. Lucan. 12.
fraternus ♂ (var. min.), Hope, Cat. Lucan. 12.
astacoides ,, ,, Tr. Linn. Soc. xviii. pars 4.

Sp. 8. C. MACLELLANDI, [♂] Hope, Tr. Ent. Soc. iv. 74 .....
,, Ann. Nat. Hist. xii. 364.
,, Cat. Lucan. 13.

Sp. 9. C. CILIPES, [♂] Thoms. Cat. Lucan. 416 .....India.

Sp. 10. C. QUADRINODOSUS, [♂] Parry, Proc. Ent. Soc. 1862, p. 109..Ind. Or.
,, *ante*, p. 22 (Tab. VIII. fig. 4).

Sp. 11. C. JENKINSII, [♂] Westw. Orient. Ent. 21, tab. x. fig. 3 ....Assama.

Sp. 12. C. FLAVIDUS, [♂] Parry, Proc. Ent. Soc. 1862, p. 110 .....India Or.
,, *ante*, p. 27 (Tab. VIII. fig. 2).

Sp. 13. C. ELEGANS, [♂] Parry, Proc. Ent. Soc. 1862, p. 110 .....India Or.
,, *ante*, p. 27 (Tab. VIII. fig. 3).

Sectio III.

Sp. 14. C. WALLACEI, [♂] Parry, Proc. Ent. Soc. 1862, p. 109....Ins. Gilolo.
,, *ante*, p. 23 (Tab. VII. fig. 2).

Sp. 15. C. DUCIPIENS, [♀] Parry, *ante*, p. 31 (Tab. IV. fig. 4) ....Malabaria.
Specimen ♂ in Mus. Lugdun., forsitan hujus speciei.

Sp. 16. C. Lafertei ♂, Reiche, Rev. Zool. 1852, p. 24, tab. i. . . Ins. Nov. Hebrid.
♀, Parry, Proc. Ent. Soc. 1862, p. 109.
,, *ante*, p. 23 (Tab. VIII. fig. 5).
Lifuanus ♂ (var. min.), Montrousier, Ann. Soc. Ent. Fr. 1860, p. 281 . . . . . N. Caledonia.

Sp. 17. C. assimilis, [♀] Parry, *ante*, p. 25 . . . . . Ins. Waigiou.
productus ♀, Parry, Proc. Ent. Soc. 1862, p. 109.

Sp. 18. C. Tragulus ♂, Voll. Tijd. v. Ent. iv. 113, tab. vii. fig. 4, 5 . . Ins. Ternate.
♀, Parry, *ante*, p. 24 (Tab. VII. fig. 6 ♂).
productus ♂, Parry, Proc. Ent. Soc. 1862, p. 109.

Sp. 19. C. Bison, [♂, ♀] Fab. Syst. El. ii. 250 (Lucanus) . . Amboyna; Celebes.
Oliv. Ent. I. i. 13, tab. iii. fig. 6.
Thunb. Mem. Soc. Nat. Mosc. i. 193.
Schönh. Syn. Ins. I. iii. 324.
Burm. Handb. v. 373 (Cladognathus).
tesserarius, Herbst, Col. iii. 298, tab. xxxiii. fig. 3 (Lucanus).
Voet. Col. i. 55, tab. xxx. fig. 6.
fulvolimbatus, Blanch. Voy. Pôle Sud, iv. 138, tab. ix. fig. 11 ♂, 12 ♀.

Sp. 20. C. cinctus, [♂] Montrousier, Faune de l'Ile de Woodlark, Ann. Soc. Agric. Lyon, vii. 26 . . Ins. Woodlark, N. Guinea, Ki, Aru.
Sp. præcedentis var.? (vid. *ante*, p. 22).

Sp. 21. C. lateralis, [♂, ♀] Hope, Cat. Lucan. 13 . . . . Ins. Philipp., Celebes.
marginatus, Burm. Handb. v. 369.

Sp. 22. C. Zebra, [♂, ♀] Oliv. Ent. I. i. 24, tab. v. fig. 17 (Lucanus) . . Birma.
Thunb. Mem. Soc. Nat. Mosc. i. 206.
Schönh. Syn. Ins. I. iii. 322.
Voll. Tijd. v. Ent. iv. 108.
Parry, *ante*, p. 25 (Tab. IV. fig. 5 ♀).

Sp. 23. C. suturalis, [♂] Oliv. Ent. I. i. 16, tab. iv. fig. 12 (Lucanus) . . Siama aut Malacca.
Fab. Syst. El. ii. 250; Ent. Syst. I. ii. 238.
Illig. Mag. iv. 104.
Thunb. Mem. Soc. Nat. Mosc. i. 200.
Hope, Ent. Mag. v. 316 . . . . . Japonia.
Parry, *ante*, p. 25.

Sp. 24. C. occipitalis, [♂, ♀] Hope, Cat. Lucan. 13 . . Ins. Philipp., Celebes, Borneo.
Westw. Orient. Ent. 22, tab. x. fig. 4.
astericus ♀, Thoms. Cat. Lucan. 417.

Sp. 25. C. biplagiatus, [♂, ♀] Westw. Tr. Ent. Soc. N. S. iii. 200, tab. x. fig. 4 (Lucanus) . . Nepalia; Thibeta; Siama.
fasciatus, Reiche, MS.

Sp 26. C. INQUINATUS, [♂, ♀] Westw. Orient. Ent. tab. viii. fig. 4 ....India.
Sp. præcedentis, var.?

Sp. 27. C. ATTENUATUS, [♂] Parry, *ante*, p. 26 (Tab. IV. fig. 2) ....Malacca.

Sp. 28. C. SERICEUS, [♂, ♀] Westw. Tr. Ent. Soc. iv. 274, tab. xx. fig. 3 (Lucanus).....Java; Borneo; Malacca.
pulverosus ♂, Parry, Proc. Ent. Soc. 1862, p. 110 (Tab. VI. fig. 1, var. max.).
juvencus ♀ (Dej.), Thoms. Cat. Lucan. 396.

Sp. 29. C. FULVONOTATUS, [♂] Parry, Proc. Ent. Soc. 1862, p. 111 .... Ind. or.
,, *ante*, p. 28 (Tab. VI. fig. 3).

Sp. 30. C. BISIGNATUS, [♂, ♀] Parry, Proc. Ent. Soc. 1862, p. 111 .... Ind. or.
,, *ante*, p. 28 (Tab. VII. fig. 3 ♂, 5 ♀).

Sectio IV.

Sp. 31. C. POLITUS, [♂] Parry, Proc. Ent. Soc. 1862, p. 110 ..... Ind. or.
,, *ante*, p. 21 (Tab. X. fig. 5).

Sp. 32. C. DORSALIS, [♂, ♀] Erichs. Act. Acad. Cæs. Leop. v. 16, Suppl. tab. xxxvii. fig. 6 ..... Ins. Philipp.
Parry, *ante*, p. 31.

Sp. 33. C. CAVIFRONS, [♂, ♀] Hope, Cat. Lucan. 13 .....Ins. Philipp.
dorsalis ♂, Burm. Handb. v. 370.
tenuipes ♀, Hope, Cat. pp. 5, 18 (Odontolabis).

Sp. 34. C. APPROXIMATUS, [♂, ♀] Parry, *ante*, p. 33.... China Cochin., Siama.

Sp. 35. C. BUDDHA, [♂] Hope, Tr. Linn. Soc. xix. 107 (Tab. XII. fig. 3).. Ind. bor.
Thibeticus (var. min.), Westw. Tr. Ent. Soc. N. S. iii. 199, tab. x. fig. 3.

Sp. 36. C. DAURICUS, [♂, ♀] Motsch. Etudes Ent. 1861, p. 10 .....Dauria.
♀, Motsch. Schrenck. Reise, Col. 138, tab. ix. fig. 11 (Metopodontus).
subæneus ♂, Motsch. Schrenck. Reise, Col. 138, tab. ix. fig. 12 (Prismognathus).

Sp 37. C. SQUAMILATERIS, [♂, ♀] Parry, Proc. Ent. Soc. 1862, p. 110.. Borneo, Malacca.
,, *ante*, p. 26.

Sp. 38. C. PERPLEXUS, [♂] Parry, Proc. Ent. Soc. 1862, p. 111..... Ind. or.
,, *ante*, p. 26.

Sectio V.

Sp. 39. C. Oweni, [♂, ♀] Hope, Cat. Lucan. pp. 4, 14 ..... Assama.
subangulatus ♀ „ „ „ pp. 6, 24 (Dorcus).

Sp. 40. C. forceps, [♂] Voll. Tijd. v. Ent. iv. 109, tab. vi. fig. 2 .. Sumatra.

Sp. 41. C. Spencii, [♂, ♀] Hope, Tr. Linn. Soc. xviii. 589 ..... Assama.
Parry, Proc. Ent. Soc. 1864, p. 8 ; *ante*, p. 37.
bulbosus ♂ (var. min.), Hope, Tr. Linn. Soc. xviii. 589, tab. xl. fig. 2.
punctiger ♀, Hope, Tr. Linn. Soc. xviii. 592 (Dorcus).
„ Cat. Lucan. 24.

Sp. 42. C. crenicollis, [♂] Thoms. Cat. Lucan. 418 ..... Ind. or.

Sp. 43. C. curvipes ♀, Hope, Cat. Lucan. 25 ..... Ind. or.
♂, Parry, *ante*, p. 35.

Sp. 44. C. rudis, [♀] Westw. *ante*, p. 35 (Tab. XI. fig. 4)..
Ind. or., vel Ins. Indicis?

Species Africanæ.

Sectio I.

Sp. 45. C. Downesii, [♂] Hope, Tr. Zool. Soc. i. 99, tab. xiii. fig. 7 ..
Fernando Po.
Hope, Cat. Lucan. 11.
de Castelnau, Hist. Nat. Ins. ii. 172.
Burm. Handb. v. 374.

Sp. 46. C. Savagei, [♂, ♀] Hope, Ann. Nat. Hist. ix. 494 ..... Afric. occ.
angulatus ♂ (var. min.), „ „ „ ; Cat. Lucan. pp. 11, 12.

Sp. 47. C. eximius, [♂, ♀] Parry, *ante*, p. 33..... Afric. occ.

Sectio II.

Sp. 48. C. serricornis, [♂] Latr. Cuv. Règne Anim. iii. tab. xvii. fig. 3..
Madagascaria.
Burm. Handb. v. 392 (Dorcus)
Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 81.
? var. *serricornis* (in Mus. Parry) .....Mozambique.

Sp. 49. C. Senegalensis, [♂, ♀] Klug, Erm. Reis. Atl. 38, 103..
Senegalia, Guinea.
de Castelnau, Hist. Nat. Ins. ii. 172.
Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 76.
Dej. Cat. 193 (Dorcus).
Antilopus ♂, Burm. Handb. v. 371.
Thoms. Cat. Lucan. 396.
Martini ♂, Hope, Cat. Lucan. 14.
bispinosus ♀, Gory, MS. (Mus. Oxon.)

Sp. 50. C. Antilopus, [♂] Swed. Act. Holm. 1787, iii. 186, tab. viii. fig. 3 ..... Sierra Leonum, Guinea.

Sp. 51. C. quadridens, [♂, ♀] Hope, Cat. Lucan. 14. . Sierra Leonum, Guinea.
Sayersii ♂ (var. max.), Hope, Cat. Lucan. 14.
piceipennis ♂ (var. med.), ,, ,, ,, .
speculifer ♂ (var. min.), ♀, ,, ,, .
Senegalensis ♂ (var. min.), ,, ,, 4 (nec Klug).
An species distincta, vel præcedentis varietas? (vid. *ante*, p. 34).

Sectio III.

Sp. 52. C. Natalensis, [♂, ♀] Parry, *ante*, p. 36 .....Natalia.

Sp. 53. C. faber, [♂, ♀] Thoms. Cat. Lucan. 419 (nec Dej. Cat.), (Tab. XII. fig. 2) ..... Afric. occ.
Cristofori, Westermann, Spinola, MS.

Sp. 54. C. modestus, [♂] Parry, *ante*, p. 29 (Tab. XII. fig. 1) .... Afric. occ.

Genus 9. HOMODERUS, Parry, Proc. Ent. Soc. 1862, p. 107 ; *ante*, p. 38.

Sp. 1. H. Mellyi, [♂, ♀] Parry, Proc. Ent. Soc. 1862, p. 107.. Guinea, Calabaria Ant.
Westw. Tr. Ent. Soc. ser. 3, i. 437, tab. xvi. fig. 7 ♂, 8 ♀.
Parry, *ante*, p. 38 (Tab. XII. fig. 6, caput ♂ var. max.).

Genus 10. CYCLORASIS, Thoms. Cat. Lucan. pp. 397, 421.
Cyclophthalmus, Hope, Cat. Lucan. 5.

Sp. 1. C. platycephalus, [♂, ♀] Hope, Ann. Nat. Hist. xii. 364.. Ind. or., Assama.
,, Trans. Ent. Soc. iv. 73.
,, Cat. Lucan. 5.
Westw. Orient. Ent. 17, tab. viii. fig. 2.
Thoms. Cat. Lucan. 421.

Sp. 2. C. Jekelii, [♂, ♀] Parry, *ante*, p. 41 (Tab. XI. fig. 4).. Chowsan, Corea.

Sp. 3. C. subnitens, [♂] Parry, Proc. Ent. Soc. 1862, p. 112 .....Ind. or.
,, *ante*, p. 42 (Tab. VII. fig. 1).

Genus. 11. CYCLOMMATUS, Parry, Tr. Ent. Soc. ser. 3, i. 449.
Cyclophthalmus, Hope, Cat. Lucan. 5.
Cladognathus, Burm. Handb. v. 364.
Megaloprepes, Thoms. Cat. Lucan. 420.

Sp. 1. C. METALLIFER, [♂, ♀] Boisd. Voy. Astrolabe, Ent. Col. 236, tab. vi. fig. 20 .....Ins. Batchian.
Parry, *ante*, p. 39.
æneomicans ♂ (var. min.) ♀, Parry, Proc. Ent. Soc. 1862, p. 111.

Sp. 2. C. TARANDUS, [♂, ♀] Thunb. Mem. Soc. Nat. Mosc. i. 190, tab. xii. fig. 1 (Lucanus) .....Borneo.
Burm. Handb. v. 374.
White, Low. Hist. Sarawak, App. 115, Ins. fig. 1.
rangifer (var. med.), Schönh. Syn. Ins. I. iii. 322.
Westw. Orient. Ent. 21, tab. x. fig. 2.

Sp. 3. C. MNISZECHII, [♂, ♀] Thoms. Rev. Zool. 1856, p. 526; Cat. Lucan. 397 (Megaloprepes) .....China.

Sp. 4. C. STRIGICEPS, [♂] Westw. Orient. Ent. 18, tab. viii. fig. 5.....Ind. or.
multidentatus (var. min.) ,, ,, 17, tab. viii. fig. 3.

Sp. 5. C. AFFINIS, [♂] Parry, *ante*, p. 40 .....Ins. Philipp.; Borneo.

Sp. 6. C. MAITLANDI, [♂] Parry, *ante*, p. 40 (Tab. XII. fig. 4).....Ins. Nias.

Sp. 7. C. FAUNICOLOR, [♂] Hope, Proc. Ent. Soc. 1844, p. 106.....Java.
Westw. Tr. Ent. Soc. iv. 273, tab. xx. fig. 1.

Sp. 8. C. DEHAANII, [♂] Westw. Ann. Nat. Hist. 1841, p. 124 .....Java.
Burm. Handb. v. 375.
metallifer, Hope, Cat. Lucan. 5.

Sp. 9. C. INSIGNIS, [♂] Parry, Proc. Ent. Soc. 1862, p. 111.....Archip. or.?
,, *ante*, p. 41.

Genus 12. CANTHAROLETHRUS, Thoms. Cat. Lucan. 411.

Sp. 1. C. LUXERII, [♂] Buquet, Ann. Soc. Ent. Fr. 1843, p. 51 (Dorcus).. Columbia.
Parry, Proc. Ent. Soc. 1864, p. 6; *ante*, p. 6 (Tab. IX. fig. 6).
Georgius, Thoms. Cat. Lucan. 412.

Sp. 2. C. REICHII, [♀] Hope, Tr. Ent. Soc. iv. 182, tab. xiii. fig. 3 (Pholidotus) .....Columbia.
Burm. Handb. v. 420, n.
Lacord. Gen. Col. iii. 12.
Thoms. Cat. Lucan. 413.
Chenu, Encycl. d'Hist. Nat. tab. x. fig. 4.
An species distincta, vel fœmina præcedentis?

Genus 13. LEPTINOPTERUS, Hope, Ent. Mag. v. 316 (1838).
Psalicerus, Dej. Cat. 194.
Psalidostomus, Burm. Handb. v. 377 (1847).

Sectio I.

Sp. 1. L. FRYI, [♂] Parry, Proc. Ent. Soc. 1862, p. 112 ..... Brasilia.
,, *ante*, p. 43 (Tab. VII. fig. 4).

Sp. 2. L. FEMORATUS, [♂, ♀] Fab. Syst. El. ii. 249; Ent. Syst. ii. 237 (Lucanus) ..... Brasilia.
Oliv. Ent. I. i. 17, tab. iv. fig. 10.
Thunb. Mem. Soc. Nat. Mosc. i. 189.
de Castelnau, Hist. Nat. Ins. ii. 172, tab. xvii. fig. 1, 2.
Schönh. Syn. Ins. I. iii. 323.
Burm. Handb. v. 378 (Psalidostomus).
Dej. Cat. 194 (Psalicerus).
rufifemoratus ♀, Hope, Cat. Lucan. 5.

Sp. 3. L. ERYTHROCNEMUS, [♂] Burm. Handb. v. 378 (Psalidostomus).. Brasilia.
Dej. Cat. 194 (*sec.* Burm.)
tibialis, Klug, Spec. alt. Ent. Braz. 20; Nov. Act. phys. med. Soc. Cæs. Leop. Car. n. c. xii. 2, 431 (*sec.* Burm.).
femoratus, Thoms. Cat. Lucan. 397.

Sp. 4. L. TIBIALIS, [♂, ♀] Esch. Ent. in Nat. Wiss. Abh. aus Dorpat, i. 61, tab. i. fig. 1 (Lucanus) ..... Brasilia.
Burm. Handb. v. 379 (Psalidostomus).
Hope, Cat. Lucan. 5.

Sectio II.

Sp. 5. L. MELANARIUS, [♂, ♀] Hope, Cat. Lucan. 15 ..... Brasilia.
funereus (var. min.) ,, ,, pp. 5, 15.
morio, Burm. Handb. v. 379.
nigripes, Dej. Cat. 194 (*sec.* Thoms.).

Sp. 6. L. IDEX, [♂, ♀] Bilb. Nov. Ins. Sp. n. 1 (Lucanus) ..... Brasilia.
Sturm, Cat. Coleop. 67, tab. ii. fig. 18*a* (var. max.), *c* (var. min.).
Germ. Mag. iv. 366.
aries ♀, Dej. Cat. 194 (*sec.* Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 78).
complanatus ♂, Dej. Cat. 194 (*sec.* Reiche, l. c.).
polyodontus ♂ (var. max.), Dej. Cat. 194 (*sec.* Reiche, l. c.).
sarcorhamphus, de Castelnau, Hist. Nat. Ins. ii. 172.

Sp. 7. L. V.-NIGER, [♂, ♀] Hope, Cat. Lucan. pp. 5, 15 ..... Brasilia.
triangularis, Dej. Cat. 194 (Psalicerus).
Burm. Handb. v. 380 (Psalidostomus).

Sp. 8. L. PULCHELLUS ♂ (MS. Mus. Berol.) ..... Amer. merid.

Sp. 9. L. POLYODONTUS, [♂, ♀] Hope, Cat. Lucan. 15 ..... Brasilia.
Burm. Handb. v. 381.

Sp. 10. L. ROTUNDATUS, [♂] Parry, Proc. Ent. Soc. 1862, p. 112 (Psalidostomus) .....Amer. merid. (Bras. ?)
Parry, *ante*, p. 43 (Tab. VII. fig. 8).
pachygnathus, MS. Mus. Berol. (Dorcus).

Genus 14. MACROCRATES, Burm. Handb. v. 381.

Sp. 1. M. BUCEPHALUS, [♂, ♀] Burm. Handb. v. 382 .....Brasilia.
Hope, Cat. Lucan. 15.
Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 78.
♀, Dohrn, Stett. Ent. Zeitsch. 1862, p. 155.
longicornis, Burm. MS.

Fam. III. DORCIDÆ.

Genus 1. HEMISODORCUS, Thoms. Cat. Lucan. 421.
Dorcus, Burm. Handb. v. 383.
Macrognathus, Hope, Cat. Lucan. 5.

Sp. 1. H. NEPALENSIS, [♂, ♀] Hope, Gray. Zool. Miscell. 1831, p. 22. (Lucanus); Cat. Lucan. 19 .....Nepalia; Assama.
Burm. Handb. v. 391.
similis, Hope, Zool. Miscell. 1831, p. 22; Cat. Lucan. 19.
Chevrolatii, Hügel, Ins. Kaschmir, iv. 532.
Chenu, Mag. de Zool. 1845, tab. xliv.
Rafflesii (var. max.), Hope, Tr. Linn. Soc. xix. 588.
Parryi (var. min.), „ Proc. Ent. Soc. 1843, p. 94; Tr. Ent. Soc. iv. 183; Cat. Lucan. 21.

Sp. 2. H. MACLEAYII, [♂, ♀] Hope, Cat. Lucan. pp. 6, 19.....Assama.

Sp. 3. H. GRACILIS, [♂, ♀] Saunders, Tr. Ent. Soc. N. S. iii. 47, tab. iii. fig. 3 (Cladognathus).....China.

Sp. 4. H. PICEIPENNIS, [♂] Westw. Tr. Ent. Soc. N. S. iii. 202, tab. x. fig. 6 (Cladognathus) ..... China vel Thibeta.

Sp. 5. H. PASSALOIDES ♀, Hope, Cat. Lucan. 24 ..... Java, Borneo.
♂, Parry, *ante*, p. 44 (Tab. X. fig. 4).

Genus 2. DITOMODERUS, Parry, *ante*, p. 45.

Sp. 1. D. MIRABILIS, [♂, ♀] Parry, *ante*, p. 45 (Tab. XII. fig. 6) .. Borneo.

Genus 3. EURYTRACHELUS, Thoms. Cat. Lucan. 421.
Platyprosopus, Hope, Cat. Lucan. 6.
Dorcus, Burm. Handb. v. 383.
Dej. Cat. 193.

Sectio I.

Sp. 1. E. Bucephalus, [♂, ♀] Perty, Cat. Col. Ind. Or. 36, fig. 5 (Lucanus) ..... India, Archip. Ind.
Burm. Handb. v. 384.
Briareus ♂, Hope, Cat. Lucan. 20.
Urus ♂, Dej. Cat. 193 (Dorcus); vid. Reiche, Ann. Soc. Ent. Fr. Ser. 3, i. 79.
Axis ♂ (var. min.), Dej. Cat. 193.
rugifrons ♀, Hope, Cat. Lucan. 24.
lateralis ♀, Dej. Coll. (vid. Reiche, l. c.)
punctifrons ♀, Sturm. Cat. Coleop. 136.
subcostatus ♀, De Haan, MS.

Sp. 2. E. Titan, [♂, ♀] Boisd. Faune de l'Océanie, 237; Voy. Astrolabe, tab. vi. fig. 19 (Lucanus).. Archip. Ind.; Ins. Philipp.; Celebes, Java.
Burm. Handb. v. 384 (Dorcus).
Voll. Tijd. v. Ent. iv. 10.

Sp. 3. E. Westermani, [♂] Hope, Tr. Linn. Soc. xix. 106 ..... Silhet.

Sp. 4. E. platymelus, [♂, ♀] Saunders, Tr. Ent. Soc. N. S. iii. 50, tab. iii. fig. 7..... China.
pilifer ♂, Voll. Tijd. v. Ent. iv. 112, tab. vi. fig. 4.
marginalis ♀, Saunders, Tr. Ent. Soc. N. S. iii. 53, tab. iv. fig. 6.
obscurus ♀, Saunders, Tr. Ent. Soc. N. S. iii. 52, tab. iv. fig. 7.

Sp. 5. E. Bubalus, [♂] Perty, Cat. Col. Ind. Or. 35 (Lucanus) Ind. or., Java?
eurycephalus, Burm. Handb. v. 387 (*sec.* Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 79, et Lacord. Gen. Col. iii. 79).
Species distincta, vel *E. Bucephali*, vel *E. Titanis* var. min.?

Sp. 6. E. Tityus, [♂, ♀] Hope, Tr. Ent. Soc. iv. 74 ..... Ind. or., Silhet.
Falco, ♂, Hope, Cat. Lucan. 6.
Chevrolatii, ♂, Thoms. Cat. Lucan. 308 (*nec* Hope).
semirugosus, ♂ (var. min.), Thoms. Cat. Lucan. 422.
ciuratus, ♀, Thoms. Cat. Lucan. 426.
lineatopunctatus, ♀, Hope, Zool. Miscell. i. 22; Cat. Lucan. 23.

Sp. 7. E. Saiga, [♂, ♀] Oliv. Ent. I. i. 29, tab. v. fig. 18 (Lucanus).. Java, Sumatra.
Fab. Syst. El. ii. 250.
Schönh. Syn. Ins. I. iii. 32, 22.
Burm. Handb. v. 387 (Dorcus).
claphus, Herbst, Col. Icon. tab. xxxiii. fig. 6.
gypaëtos, de Castelnau, Hist. Nat. Ins. ii. 172.
Chevrolatii (var. max.), Hope, Ann. Nat. Hist. xii. 364; Cat. Lucan. 20.
incertus (var. min.), Hope, Cat. Lucan. 22.

Sp. 7. E. Saiga—*contin.*
dubius (var. min.), Hope, Cat. Lucan. 21.
indeterminatus ,, ,, ,, 22.
lateralis ♀, Dej. Cat. 193.
pygargus ♀, ,, ,,
inermis ♀, Fab. (sec. spec. in Mus. Hopeiano).

Sp. 8. E. cribriceps, [♂, ♀] Chevr. Rev. Zool. 1841, p. 224....Ins. Philipp.
Moloschus, Hope, Cat. Lucan. 21 (1845).
Oryx, Burm. Handb. v. 389 (1847).

Sp. 9. E. purpurascens, [♂, ♀] Voll. Tijd. v. Ent. iv. 111, tab. vii. fig. 1, 2 ♂ (fig. 6 ♀, vid. *ante*, p. 24).. Sumatra, Malacca.

Sp. 10. E. concolor, [♂] Blanch. Voy. Pôle Sud, iv. 138, tab. ix. fig. 10 ..... Amboyna.
Ceramensis, Thoms. Cat. Lucan. 424.

Sp. 11. E. Thomsoni, [♂] Parry, *ante*, p. 47 ..... Ins. Molucc.

Sectio II.

Sp. 12. E. Reichii, [♂, ♀] Hope, Ann. Nat. Hist. xii. 364; Tr. Ent. Soc. iv. 74; Cat. Lucan. 21..... Silhet.
cognatus (var. min.), Hope, Ann. Nat. Hist. xii. 364; Tr. Ent. Soc. iv. 75.
Blanchardi (var. min.), Hope, ll. cc.; Cat. Lucan. 21.
punctilabris (var. min.), Hope, ll. cc.

Sp. 13. E. Niponensis, [♂, ♀] Voll. Tijd. v. Ent. iv. 113, tab. vii. fig. 3 (Dorcus) ..... Japonia?
diabolicus, Thoms. Cat. Lucan. 423.

Genus 4. DORCUS, M'Leay, Hor. Ent. i. 111.
Thoms. Cat. Lucan. 398.

Sectio I.

Sp. 1. D. Antæus, [♂] Hope, Ann. Nat. Hist. xii. 364; Tr. Ent. Soc. iv. 74; Cat. Lucan. pp. 6, 20 (Platyprosopus)....Assama.
Hujus speciei sit forsitan fœmina *Dorcus Scaritides* (*post*, p. 90)?

Sp. 2. D. Dehaanii, [♂, ♀] Hope, Tr. Linn. Soc. xix. 106; Cat. Lucan. 22 .....Assama.
Klugii ♂ (var. max.), Thoms. Cat. Lucan. 424.
curvidens ♂ (var min.), Hope, Tr. Linn. Soc. xviii. 589; Cat. Lucan. 22.

Sp. 3. D. Hopei, [♂, ♀] Saunders, Tr. Ent. Soc. N. S. iii. 50, tab. iii. fig. 8 .....China.
striatopunctatus (var. min.), Saunders, Tr. Ent. Soc. N. S. iii. 51, tab. iv. fig. 5.
striatus ♀, Saunders, Tr. Ent. Soc. N. S. iii. 53, tab. iv. fig. 4.

Sp. 4. D. Parryi, [♂] Thoms. Cat. Lucan. 425 .....Ins. Celebes.

Sp. 5. D. Ternatensis, [♂] Thoms. Cat. Lucan. 423 .....Ins. Ternate.

Sectio II.

Sp. 6. D. vicinus, [♂, ♀] Saunders, Tr. Ent. Soc. N. S. iii. 51, tab. iv. fig. 9 ♂.....China.

Sp. 7. D. submolaris, [♂] Hope, Cat. Lucan. pp. 6, 23 .....India.
Bengalensis (var. min.) „ pp. 6, 22.

Sp. 8. D. binervis, [♂] Motsch. Etudes Ent. 1861, p. 18..Ins. Tzousima (Coreæ).

Sp. 9. D. cylindricus, [♂] Thoms. Cat. Lucan. 427..... India.

Sp. 10. D. parallelus, [♂, ♀] Burm. Handb. v. 395 .....Amer. bor.
Knoch, Melsheimer, Cat. 57.
Say, Journ. Acad. Nat. Sc. Philad. iii. 248.
Voetii, Schönh. Syn. Ins. I. iii. 326 (Lucanus).
aper, Dej. Cat. 193.
Hope, Cat. Lucan. 6.

Sp. 11. D. brevis, [♂] Say, Journ. Acad. Nat. Sc. Philad. v. 202 (vid. Melsheimer, Cat. 57) .....Amer. bor.

Sp. 12. D. Mazama, [♂] Leconte, Proc. Acad. Nat. Sc. Philad. 1861, p. 345 .....N. Mexico.
Parry, *ante*, p. 51.

Sp. 13. D. parallelepipedus, [♂, ♀] Linn. Syst. Nat. I. ii. 561 (Lucanus).....Europa, Tanger.
M'Leay, Hor. Ent. i. 111.
Burm. Handb. v. 393.
Mulsant, Lamell. de Fr. 581, tab. i. fig. 18.
Lucas, Ann. Soc. Ent. Fr. 1858, Bulletin, p. 4.
Ratzeb. Forst. Ins. i. 86, tab. iii. fig. 19.
Dufour, Ann. Sc. Nat. ser. 2, xviii. 166, fig. 5 A.
Schönh. Syn. Ins. I. iii. 325.
Truquii ♂, var., Mulsant, Ann. Soc. Linn. Lyon, ii. 14.
bituberculatus ♀, M'Leay, Hor. Ent. i. 112.

Sp. 14. D. Musimon, [♂, ♀] Gené, Ins. Sard. i. 32, tab. i. fig. 23 ♀, ii. 28, tab. i. fig. 19 ♂ .....Sardinia, Afric. bor. Burm. Handb. v. 394.

Sp. 15. D. Peyronis, [♂, ♀] Reiche et Saulcy, Ann. Soc. Ent. Fr. ser. 3, iv. 407, tab. xii. fig. 9 .....Syria; Caramania.

Sp. 16. D. Scaritides, [♀] Hope, Cat. Lucan. 24.....Ind. Himalay. Forsitan *D. Antæi* (*ante*, p. 88) fœmina?

Sp. 17, D. derelictus, [♀?] Parry, Proc. Ent. Soc. 1862, p. 112..Ind. Himalay. „ *ante*, p. 50.

Sp. 18. D. Hydrophiloides, [♀] Hope, Cat. Lucan. 23.. N. Holl.; Ins. Melville.

Sp. 19. D. carbonarius, [♀] West. Tr. Ent. Soc. ser. 3, i. 515, tab. xxi. fig. 3. .....N. Holl.

Sp. 20. D. Pelorides, [♀] Westw. Tr. Ent. Soc. N. S. iii. 220; *ib.* ser. 3, i. 514, tab. xxi. fig. 2..Sin. Moreton. (Nov. Holl.). Hujus speciei sit forsitan mas *Lissotes Howittanus* (post, p. 97)?

Genus 5. MACRODORCAS,* Motsch. Etudes Ent. 1861, p. 15.
Psalidostomus, „ „ 1857, p. 29.

Sp. 1. M. rectus, [♂, ♀] Motsch. Etudes Ent. 1861, p. 16 .....Japonia.
„ „ 1857, p. 29.

Sp. 2. M. rugipennis, [♂] Motsch. Etudes Ent. 1861, p. 16 .....Japonia.

Sp. 3. M. striatipennis, [♂] Motsch. Etudes Ent. 1861, p. 17.....Japonia.

Sp. 4. M. cribellatus, [♂] Motsch. Etudes Ent. 1861, p. 17.....Japonia.

Genus 6. SERROGNATHUS,* Motsch.

Sp. 1. S. castanicolor, [♂] Motsch. Etudes Ent. 1861, p. 12..Ins. Tzousima.

Genus 7. GNAPHALORYX, Burm. Handb. v. 396.
Macrognathus, Hope, Cat. Lucan. 5.
Dorcus, Dej. Cat. 194.

Sp. 1. G. Taurus, [♂, ♀] Fab. Syst. El. ii. 250 (Lucanus) .... Archip. Ind.
Hope, Cat. Lucan. 5 (Macrognathus).
Bonasus, Dej. Cat. 194 (Dorcus).
opacus, Burm. Handb. v. 397.

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* Genera *Macrodorcas* et *Serrognathus* descriptionibus solummodo mihi cognita.

Sp. 2. G. SQUALIDUS, [♂, ♀] Hope, Cat. Lucan. pp. 5, 19.....Java.
tomentosus, Burm. Handb. v. 397.
Dej. Cat. 194.
lutulentus, Dehaan, MS.

Sp. 3. G. DILATICOLLIS, [♂] Parry, *ante*, p. 51 .....Archip. Ind.?

Sp. 4. G. PARVULUS, [♂, ♀] Hope, Cat. Lucan. pp. 6, 25 (Dorcus)..
Ins. Philipp.

Sp. 5. G. SCULPTIPENNIS, [♂] Parry, *ante*, p. 52.....N. Guinea.

Sp. 6. G. VELUTINUS, [♂, ♀] Thoms. Cat. Lucan. 426 (Dorcus) ....Ind. or.

Genus 8. ÆGUS, M'Leay, Hor. Ent. i. 112.
Burm. Handb. v. 398.

Sectio I.

Sp. 1. Æ. ACUMINATUS, [♂, ♀] Fab. Syst. El. ii. 251 (Lucanus)..
Java, Sumatra.
Schönh. Syn. Ins. I. iii. 325.
Burm. Handb. v. 399.
cornutus ♂, Thunb. Mem. Soc. Nat. Mosc. i. 202, tab. xii. fig. 3.
cicatricosus ♀, Wied. Zool. Mag. II. i. 108 (vid. *ante*, p. 52).
luteus ♀, Westw. Tr. Ent. Soc. N. S. iii. 118, tab. xii. fig. 4 (vid. *ante*, p. 51).
obscurus ♀, M'Leay, Hor. Ent. i. 113 (*sec.* Burm.)
striatellus ♀, Perty, Col. Ind. Or. 35 (*sec.* Burm.)

Sp. 2. Æ. LUNATUS, [♂, ♀] Weber, Obs. Ent. i. 83 (Lucanus)..Java, Sumatra.
Fabr. Syst. El. ii. 252.
Schönh. Syn. Ins. I. iii. 327.
Illig. Mag. i. 249; *ib.* iv. 104, 19 et 25.
Thunb. Mem. Soc. Nat. Mosc. i. 203.
Burm. Handb. v. 400.
Hope, Cat. Lucan. 6.
Thoms. Cat. Lucan. 399.
falciger, Westw. Ann. Sc. Nat. ser. 2, i. 118, sub. 10.
porcellus, Dej. Cat. 194 (Dorcus).
depressus, Illig. Wied. Archiv. I. i. 105.
punctatus ♀, Fabr. Syst. El. ii. 253.
Sp. præcedentis var. minor? (vid. *ante*, p. 53).

Sp. 3. Æ. KANDIENSIS, [♂, ♀] Hope, Cat. Lucan. 6 (vid. *ante*, p. 53)..
Ins. Taprob., Philipp. et Borneo.
Thoms. Cat. Lucan. 399.
cicatricosus ♀, Hope, Cat. Lucan. 6.

Sp. 4. Æ. CHELIFER, [♂, ♀] M'Leay, Hor. Ent. i. 113 (vid. *ante*, p. 54)..
Cambodia, Malacca.
Boisd. Voy. Astrolabe, 235.
? Montrousier, Faun. Woodlark, p. 27 .....Ins. Woodlark.

Sectio II.

Sp. 5. Æ. CAPITATUS, [♂, ♀] Westw. Tr. Ent. Soc. iv. 275, tab. xx. fig. 5 (Dorcus).. Malacca, Borneo, Ins. Walliæ Principis.
platycephalus, Westw. l. c. (Dorcus).
Thoms. Cat. Lucan. 399.
Burm. Handb. v. 401.
distinctus (var. med.), West. Tr. Ent. Soc. iv. 276, tab. xx. fig 8 (Dorcus).
Burm. Handb. v. 402.
æqualis (var. min.), Westw. l. c., tab. xx. fig. 6 (Dorcus).
Burm. p. 401.
Malabaricus ♀, Westw. l. c., tab. xx. fig. 7 (Dorcus).
Burm. l. c.
sinister ♀, Hope, Cat. Lucan. pp. 6, 23 (Dorcus).

Sp. 6. Æ. PARALLELUS, [♂] Hope, Cat. Lucan. pp. 6, 22 (Dorcus).. Ind. bor. et Ins. Walliæ Principis.
Sp. præcedentis vel sequentis var. min.?

Sp. 7. Æ. LABILIS, [♂] Westw. *ante*, p. 54 (Tab. XII. fig. 5).. Ind. (Darjeeling).

Sp. 8. Æ. LÆVICOLLIS, [♂, ♀] Saunders, Tr. Ent. Soc. N. S. iii. 54, tab. iv. fig. 8 ..... China.
punctiger ♀, Saunders, Tr. Ent. Soc. N. S. iii. 55, tab. iii. fig. 6.

Sp. 9. Æ. ESCHSCHOLTZII, [♂] Hope, Cat. Lucan. pp. 6, 22.. Malacca, Ins. Walliæ Principis.

Sp. 10. Æ. PLATYODON, [♂, ♀] Parry, Proc. Ent. Soc. 1862, p. 112.. Ins. Gilolo.
,, *ante*, p. 56 (Tab. X. fig. 1).
? *chelifer* (var. min.), Montrousier (vid. *ante*, p. 54).

Sp. 11. Æ. BLANDUS, [♂] Parry, *ante*, p. 57 ..... Ins. Salwotty, N. Guinea.

Sp. 12. Æ. PUNCTIPENNIS, [♂, ♀] Parry, *ante*, p. 58 ..... Borneo.

Sp. 13. Æ. SERRATUS, [♂] Parry, *ante*, p. 58 (Tab. V. fig. 1).. Ins. Morty (Oc. Pacif. bor.)

Sp. 14. Æ. INSIPIDUS, [♂] Thoms. Cat. Lucan. 428 ..... Ins. Celebes.
? *chelifer* (var. min.), Montrousier (vid. *ante*, p. 54.)

Sp. 15. Æ. IMPRESSICOLLIS, [♂, ♀] Parry, *ante*, p. 58 (Tab. V. fig. 3).. Borneo; Malacca.

Sp. 16. Æ. INERMIS, [♂?] Fabr. Syst. El. ii 251, 17 (vid. *ante*, p. 49).. Sumatra.
M'Leay, Hor. Ent. i. 113.

Sp. 17. Æ. INTERRUPTUS, [♂?] M'Leay, Hor. Ent. i. 113 ..... India?
Westw. Ann. Sc. Nat. ser. 2, i. 118.
Burm. Handb. v. 401.

Sp. 18. Æ. POLITUS, [♂] Montrousier, Faune de Woodlark, p. 28 .. Ins. Woodlark.
? *chelifer*, Montr. (vid. *ante*, p. 54).

Sp. 19. Æ. MALACCUS, [♂, ♀] Thoms. Rev. Zool. 1856, p. 516 ..
Malacca; Sumatra.
rectangulus (var. max.), Voll. Tijd. v. Ent. iv. 115, tab. vii. fig. 7.

Sp. 20. Æ. MYRMIDON, [♂, ♀] Thoms. Rev. Zool. 1856, p. 516 .... Malacca.

Sp. 21. Æ. ADELPHUS, [♂, ♀] Thoms. Cat. Lucan. 428 ..... Borneo.

Sp. 22. Æ. GLABER, [♂] Parry, *ante*, p. 59 ..... N. Guinea.

Sectio III.

Sp. 23. Æ. TRILOBATUS, [♂] Parry, Proc. Ent. Soc. 1862, p. 113 .... Borneo.
,, *ante*, p. 59 (Tab. VII. fig. 7).

Genus 9. ALCIMUS, Fairmaire.

Sp. 1. A. DILATATUS, [♀] Fairm. Rev. Zool. 1849, p. 416, tab. xi. fig. 6..
Ins. Wallis.

Genus 10. PLATYCERUS, Geof. Ins. Env. Paris, i. 59.

Sp. 1. P. CARABOIDES, [♂, ♀] Linn. Syst. Nat. I. ii. 561 (Lucanus) .. Europa.
Fabr. Syst. El. ii. 253.
Oliv. Ent. I. i. 20, tab. ii. fig. 2.
Schönh. Syn. Ins. I. iii. 329.
Curtis, Brit. Ent. vi. 274.
Thunb. Mem. Soc. Nat. Mosc. i. 194.
Burm. Handb. v. 405.
capra, De Geer, Mem. iv. 334, tab. xii. fig. 11.
rufipes, Fabr. Syst. El. ii. 253.
Latr. Gen. Cr. et Ins. ii. 134, 2, obs.
spinifer, var. ?, Schaufuss (Cat. Coleop., Dresd. 1863).

Sp. 2. P. CAUCASICUS, [♂] Parry, *ante*, p. 60 ..... Caucaso.

Sp. 3. P. QUERCUS, [♂, ♀] Weber, Obs. Ent. i. 85 (Lucanus) .... Amer. bor.
Burm. Handb. v. 406.
Schönh. Syn. Ins. I. iii. 331.
Melsh. Cat. Coleop. U. S. 57.
securidens? Say, Journ. Acad. Nat. Sc. Philad. iii. 249; *id.* Col. Exped. Rocky Mountains.
piceus? Kirby, Faun. Amer. bor. 141 (Melsh. Cat.)
Scaritoides? Thunb. (Sturm. Cat. 1843, p. 136).
virescens? Fabr. App. Syst. Ent. 817.

Sp. 4. P. DEPRESSUS, [♂, ♀] Leconte, Agass. i. Supp. p. 224 .... Amer. bor.
Melsh. Cat. Coleop. U. S. 57.
piceus? Kirby, Faun. Amer. bor. 141.
Helopioides, Dej. Cat. 194.

Sp. 5. P. Oregonensis, [♂] Westw. Tr. Ent. Soc. iv. 277, tab. xx. fig. 9..Oregon.
securidens ? Say, Journ. Acad. Philad. iii. 249.
Sp. præcedentis varietas ? (vid. Leconte, Proc. Acad. Nat. Sc. Philad. 1861, p. 345).

Sp. 6. P. cærulescens, [♂] Leconte, Proc. Acad. Nat. Sc. Philad. 1861, p. 345 .....California.
Parry, *ante*, p. 60.

Sp. 7. P. Agassii, [♀] Leconte, Proc. Acad. Nat. Sc. Philad. 1861, p. 345.....California.
Parry, *ante*, p. 60.

Sp. 8. P. ? ebeninus, [♂] H. Deyrolle, MS. .....Brasilia.
N. Sp. cujus descriptio in Ann. Soc. Ent. Fr. 1864.

Genus II. SCORTIZUS, Westw. Ann. Sc. Nat. ser. 2, i. 119.

Sp. 1. S. maculatus, [♂, ♀], Klug, N. Act. Ac. Nat. Cur. XII. ii. 432 (Lucanus).....Brasilia.
Burm. Handb. v. 422.
Westw. Tr. Ent. Soc. N. S. iii. 210, tab. xi. fig. 8.
Lacord. Gen. Coleop. iii. 31.
Hope, Cat. Lucan. 1.
irroratus, Hope, Tr. Zool. Soc. i. 100, tab. xiv. fig. 3 ♀ (Pholidotus).
Westw. Ann. Sc. Nat. ser. 2, i. 119.
Chenu, Encycl. d'Hist. Nat. tab. xv. fig. 1 ♂.

Sp. 2. S. cucullatus, [♂, ♀] Blanch. Voy. d'Orbigny, vi. 194; Ins. tab. xii. fig. 10 ♂ (Lucanus) .....Chili.
Solier, Gay. Hist. Chili, Zool. v. 46, tab. xv. fig. 4 ♂ (Sclerostomus).
cornutus ♀, Solier, MS.

Genus 12. SCLEROSTOMUS, Burm. Handb. v. 423.
Sclerognathus, Hope, Cat. Lucan. 7.
Epipedus, Solier, Gay. Hist. Chili, Zool. v. 49.
Pycnosiphorus, ,, ,, ,, 56.
Godartia, Chenu, Encycl. d'Hist. Nat. tab. xv. fig. 6.

Sectio I.

Sp. 1. S. Bacchus, [♂, ♀] Hope, Cat. Lucan. 26 (Dorcus) ..... Chili.
Darwinii, Burm. Handb. v. 424.
Solier, Gay. Hist. Chili, Zool. v. 48 (Dorcus).
Chilensis, Dej. Cat. 193 (Dorcus).

Sp. 2. S. FEMORALIS, [♂, ♀] Guér. Rev. Zool. 1839, p. 303..Chili, Patagonia.
Solier, Gay. Hist. Chili, v. 51 (Epidedus).
Westw. Tr. Ent. Soc. N. S. iii. 209, tab. xii. fig. 9.
Darwinii ♂ (var. max.), Hope, Ann. Nat. Hist. viii. 302; Cat. Lucan. 25.
rubripes ♂ (var. min.), Hope, Cat. Lucan. 26.
Burm. Handb. v. 424.
rufifemoralis ♂, Curtis, Voy. Capt. King, Magellan, Tr. Linn. Soc. xix. 456.
rufipes, Solier, Gay. Hist. Chili, v. 50.
Spinolæ, ,, ,, ,, ,, 52.
leiocephalus, ,, ,, ,, 53.
modestus, Philippi, Anal. Univ. Santiago, 1859 (vid. Stett. Ent. Zeit. 1860, p. 245).

Sp. 3. S. FAIRMAIRII, [♂, ♀] Parry, *ante*, p. 61 .....Chili.

Sp. 4. S. ROULETI, [♂, ♀] Solier, Gay. Hist. Chili, v. 53 ..... Chili.

Sp. 5. S. CÆLATUS, [♂, ♀], Blanch. Voy. d'Orbigny, vi. 2, tab. xii. fig. 8 ♀ ..... Chili.
Solier, Gay. Hist. Chili, v. 49.
variolosus, Hope, Cat. Lucan. 25.
vittatus, Burm. Handb. v. 423 (Scortizus).
Thoms. Cat. Lucan. 400.
Cumingii, Hope (olim).
circumdatus, Dej. Coll. (nec Cat.)

Sp. 6. S. FASCIATUS, [♀] Germain, Anal. Univ. Santiago, 1855, p. 397, n. 36 (Tab. III. fig. 4). ..... Chili.

Sp. 7. S. LINEATUS, [♀] H. Deyrolle, MS. (Tab. III. fig. 3). .....Peru.
N. sp. cujus descriptio in Ann. Soc. Ent. Fr. 1864.

Sectio II.

Sp. 8. S. PLAGIATUS, [♂] Burm. Handb. v. 425..... Brasilia.
hastatus, Westw. Tr. Ent. Soc. N. S. iii. 205, tab. xi. fig. 2.
Thoms. Cat. Lucan. 400.

Sp. 9. S. LESSONII, [♂, ♀] Buquet, Ann. Soc. Ent. Fr. 1842, p. 283, tab. xii. fig. 1 .....Chili.
Chenu, Encycl. d'Hist. Nat. tab. xv. fig. 6 (Godartia).
Solier, Gay. Hist. Chili, v. 55.
mandibularis, ,, ,, 56, tab. xv. fig. 5 (Pycnosiphorus).

Sp. 10. S. PHILIPPI, [♂, ♀] Westw. *ante*, p. 61 (Tab. XI. fig. 5.).....Chili.
Sp. sequentis var.?

Sp. 11. S. PALLIDOCINCTUS, [♂, ♀] Fairm. et Germ. Coleop. Chil. 2 (Dorcus) ..... Chili.

Sp. 12. S. VITTATUS, [♂, ♀] Esch. Ent. 2; Nat. Wiss. Abhandl. aus Dorpat, i. 65 (Lucanus) ..... Chili.
Blanch. Voy. d'Orbigny, vi. 194, tab. xii. fig. 9.
Solier, Gay. Hist. Chil. v. 50.
rubrovittatus, Blanch. l. c. (olim).
Burm. Handb. v. 423 (Scortizus).

Sectio III.

Sp. 13. S. COSTATUS, [♂, ♀] Burm. Handb. v. 426 ..... Brasilia.
Westw. Tr. Ent. Soc. N.S. iii. 209, tab. xi. fig. 5 ♀.
Hope, Cat. Lucan. 27.
cuniculus, Thoms. (Dej. Cat.) Cat. Lucan. 429.

Sp. 14. S. NEOTRAGUS, [♂, ♀] Westw. Tr. Ent. Soc. N. S. iii. 207, tab. xi. fig. 3 ..... Brasilia.
cribratus ♀, Thoms. Cat. Lucan. 429.
An sp. sequentis var.?

Sp. 15. S. CRUENTUS, [♂] Burm. Handb. v. 425 ..... Brasilia.

Sp. 16. S. SIGNATIPENNIS, [♂] H. Deyrolle, MS. ..... Brasilia.
Species nova, cujus descriptionem dabit Dom. Deyrolle in Ann. Soc. Ent. Fr. 1864.

Sp. 17. S. DITOMOIDES, [♂] Westw. Tr. Ent. Soc. N. S. iii. 208, tab. xi. fig. 4 ..... Brasilia.

Sp. 18. S. TUBERCULATUS, [♀] Solier, Gay. Hist. Chil. v. 54 ..... Chili.

Genus 13. OÖNOTUS, Parry, *ante*, p. 63.

Sp. 1. O. ADSPERSUS, [♀] Bohem. Ins. Caffr. ii. 384 (Dorcus) ..... Natalia.
Westw. Tr. Ent. Soc. ser. 3, i. 435, tab. xvi. fig. 4.

Genus 14. LISSOTES, Westw. Tr. Ent. Soc. N.S. iii. 213.

Gerstäcker, Bericht d. Ent. 1855, p. 57.
Sclerostomus, Thoms. Cat. Lucan. 400.

Sectio I.

Sp. 1. L. RETICULATUS, [♂, ♀] Westw. Tr. Ent. Soc. iv. 275, tab. xx. fig. 4 (1845); *ib.* N.S. iii. 218, tab. xii. fig. 9.. N. Zeelandia.
squamidorsis, White, Voy. Ereb. and Terror, 9, tab. ii. fig. 2 (Dorcus, 1846).
Blanch. Voy. Pôle Sud, iv. 140 (Dorcus).
cicatricosus, Burm. Handb. v. 403 (Ægus, 1847).
Zeelandicus, Fairm. Rev. Zool. 1849, p. 414 (Dorcus).
Blanch. l. c. tab. ix. fig. 13.

Sp. 2. L. Novæ-Zeelandiæ, [♂, ♀] Hope, Cat. Lucan. 25 (Dorcus).. N. Zeelandia.
punctulatus, White, Voy. Ereb. & Terror, 9 (Dorcus).
caviceps, Westw. Tr. Ent. Soc. N.S. iii. 212, tab. xii. fig. 6 ♂, 7 ♀ (Sclerostomus).

Sp. 3. L. Cancroides, [♂, ♀] Fabr. Syst. El. ii. 251 (Lucanus)....Tasmania.
Oliv. Ent. I. i. 18, tab. iv. fig. 11.
Westw. Ent. Mag. v. 267, cum fig.; Tr. Ent. Soc. N. S. iii. 215.
Boisd. Voy. Astrolabe, 234.
Burm. Handb. v. 402 (Ægus).
Thunb. Mem. Soc. Nat. Mosc. i. 200.
Schön. Syn. Ins. I. iii. 326.

Sp. 4. L. subtuberculatus, [♂] Westw. Tr. Ent. Soc. N. S. iii. 215, tab. xii. fig. 2 .....N. Holl.?
Sp. præcedentis varietas?

Sp. 5. L. crenatus, [♂, ♀] Westw. Tr. Ent. Soc. N. S. iii. 216, tab. xii. fig. 3 .....N. Holl.
Cancroides, Thoms. Cat. Lucan. 400.

Sp. 6. L. obtusatus, [♂, ♀] Westw. Ent. Mag. v. 267, cum fig. (Dorcus); Tr. Ent. Soc. N. S. iii. 217 (Lissotes)..Tasmania.
Burm. Handb. v. 402 (Ægus).
Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 82.

Sp. 7. L. curvicornis, [♂] Boisd. Faune de l'Océanie, 235 ....N. Hollandia.
Latr. MS.; Dej. Cat. 194.
Thoms. Cat. Lucan. 400.
Sp. præcedentis varietas?

Sectio II.

Sp. 8. L. Howittanus, [♂] Westw. Tr. Ent. Soc. ser. 3, i. 513, tab. xxi. fig. 1 (Dorcus) .....N. Holl. or.
Hujus sit forsitan fœmina *Dorcus Pelorides*, *ante*, p. 90?

Sp. 9. L. Menalcas, [♂, ♀] Westw. Tr. Ent. Soc. N. S. iii. 214, tab. xii. fig. 1 (vid. *ante*, p. 63) .....Nov. Hollandia.

Fam. IV. FIGULIDÆ.

Genus 1. NIGIDIUS, M'Leay, Hor. Ent. i. 108.
Westw. Ann. Sc. Nat. ser. 2, i. 121.
Eudora, de Castelnau, Hist. Nat. Ins. ii. 174.

Sectio I.

Sp. 1. N. grandis, [♂] Hope, Ann. Nat. Hist. viii. 302; Tr. Ent. Soc. iii. 279; Cat. Lucan. 26 ..... Sierra Leonum, Gabono.
Georgianus, Thoms. Arch. Ent. ii. tab. i. fig. 4.
Mniszechii, ,, ,, p. 47.

Sp. 2. N. Bubalus, [♂] Swed. Act. Holm. 1787, p. 187, tab. viii. fig. 4 (Lucanus) .....Guinea, Senegalia.
Westw. Ent. Mag. v. 266 (Nigidius).
Burm. Handb. v. 432.
integer, Westw. Ent. Mag. v. 265.
auriculatus, Klug, Erm. Reis. Atl. 39, 104, tab. xv. fig. 10.
vervex, Dej. Cat. 194 (Figulus).
Midas, de Casteln. Hist. Nat. Ins. ii. 174, tab. xvii. fig. 5 (Eudora).

Sp. 3. N. Delgorguei, [♂, ♀] Thoms. Cat. Lucan. 430 .....Natalia.

Sp. 4. N. auriculatus, [♂, ♀] Guér. Icon. Règ. Anim. tab. xxvii. fig. 4 (Platycerus) .....Senegalia, Gabono.
Westw. Ent. Mag. v. 265 (Nigidius).
Burm. Handb. v. 433.
Thoms. Arch. Ent. ii. 48.

Sp. 5. N. nitidus, [♂, ♀] Thoms. Cat. Lucan. 431.....Senegalia, Gabono.
An var. tantùm sp. præcedentis?

Sp. 6. N. cornutus, [♂, ♀] M'Leay, Hor. Ent. i. 109, fig. 6 (partes oris) .....Cambodia, Malacca.
Westw. Ent. Mag. v. 264.
Burm. Handb. v. 434.
Parry, *ante*, p. 63.

Sp. 7. N. obesus, [♂] Parry, *ante*, p. 63 .....Malacca.

Sp. 8. N. lævicollis, [♂, ♀] Westw. Ent. Mag. v. 264 .....Ins. Philipp.
Hope, Cat. Lucan. 7.
forcipatus, Westw. Ent. Mag. v. 267.
(Esch. MS.), Dej. Cat. 194 (Figulus).
Burm. Handb. v. 433.
Thoms. Cat. Lucan. 401.

Sectio II.

Sp. 9. N. Madagascariensis, [♂, ♀] de Cast. Hist. Nat. Ins. ii. 175 (Eudora).....Madagascaria.
Westw. Ent. Mag. v. 266 (Nigidius).
Burm. Handb. v. 434.
Bucephalus, Dup. MS.; Hope, Cat. Lucan. 7.

Genus 2. AGNUS, Burm. Handb. v. 441.

Sp. 1. A. egenus, [♂] Burm. Handb. v. 442 .....Mauritio.
agnus, Dej. Cat. 194 (Dorcus).
Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 84.

Genus 3. PENICHROLUCANUS, H. Deyr. Ann. Soc. Ent. Fr. ser. 4, iii. 485.

Sp. 1. P. corricephalus, [ ] H. Deyr. l. c. tab. ix. fig. 11 (vid. *ante*, p. 64) .....Malacca.

Genus 4. FIGULUS, M'Leay, Hor. Ent. i. 110.
Westw. Ann. Soc. Nat. ser. 2, i. 119; Ent. Mag. v. 261.
Burm. Handb. v. 435.

Sectio I.

Sp. 1. F. sublævis, [♂] Pal. de Beauv. Ins. Afr. et Amer. i. 3, tab. i. fig. 3 (Lucanus) .....Afric. occ.
Westw. Ent. Mag. v. 262 (Figulus).
Schönh. Syn. Ins. I. iii. 331.
? Thoms. Cat. Lucan. 402.
monilifer, Parry, Proc. Ent. Soc. 1862, p. 113.....Nov. Zeelandia?

Sp. 2. F. anthracinus, [♂, ♀] Klug, Ins. Madagasc. 85 ....Madagascaria.
Sturm, Cat. Coleop. 137.
ebenus, Westw. Ann. Soc. Nat. ser. 2, i. 120, tab. vii. fig. 4; Ent. Mag. v. 261.
vulneratus, Thoms. Cat. Lucan. 433 (vid. *ante*, p. 64).

Sp. 3. F. nigrita, [♂, ♀] Westw. Ent. Mag. v. 261 .....Senegalia.
Hope, Cat. Lucan. 7.
sublævis, Burm. Handb. v. 436.
Thoms. Cat. Lucan. 402.
ovis?, Dej. Cat. 194.
An sp. distincta, vel *F. sublævis* (Pal. de Beauv.) var.?

Sp. 4. F. lævipennis, [♂, ♀] Montrousier, Ann. Soc. Ent. Fr. 1860, p. 286.....N. Caledonia.

Sectio II.

Sp. 5. F. trilobus, [♂, ♀] Westw. Ent. Mag. v. 263 .....N. Hollandia.
Burm. Handb. v. 439.
cornutus, Thoms. Cat. Lucan. 401 (Nigidius).

Sp. 6. F. intigricollis, [♂], Thoms. Cat. Lucan. 431 .....Ins. Mariannæ.

Sp. 7. F. regularis, [♂, ♀] Westw. Ann. Sc. Nat. ser. 2, i. 120; Ent. Mag. v. 263 .....N. Holl.
Hope, Cat. Lucan. 7.
Burm. Handb. v. 437.
Australicus, Thoms. Cat. Lucan. 432.
Pacificus, Dej. Cat. 194.

Sp. 8. F. sulcicollis, [♂, ♀] Hope, Cat. Lucan. 26 .....Port. Essingtonio.

Sp. 9. F. FOVEICOLLIS, [♂, ♀] Boisd. Faun. de l'Oc. 239 (Platycerus).. Ins. Maris Pacif. merid.
Burm. Handb. v. 437 (Figulus).
Fairm. Rev. Zool. 1849, p. 414.
insularis, Blanch. Voy. Pôl. Sud, 142, tab. ix. fig. 14 (*sec.* Fairm. l. c.)
Woodlarkianus, Montrousier, Faun. Woodlark, 26.
Lifuanus, ,, ,, Ann. Soc. Ent. Fr. 1860, p. 287.

Sp. 10. F. STRIATUS, [♂, ♀] Oliv. Ent. I. i. 19, tab. iv. fig. 14 (Lucanus).. Mauritio, et Ins. Borbonica.
Fabr. Syst. El. ii. 253.
Westw. Ent. Mag. v. 262 (Figulus).
Hope, Coleopt. Man. 79.
Burm. Handb. v. 438.
Schönh. Syn. Ins. I. iii. 331 (Platycerus).
striata, de Cast. Hist. Nat. Ins. ii. 175, tab. xvii. fig. 6 (Eudora).

Sp. 11. F. CONFUSUS, [♂, ♀] Westw. Ent. Mag. v. 262..Ind. or.?, Cambodia.
Burm. Handb. v. 439.
striatus?, M'Leay, Hor. Ent. i. 100.

Sp. 12. F. LATICOLLIS, [♂, ♀] Thoms. Cat. Lucan. 402 .....Ins. Philipp.
Reiche, Ann. Soc. Ent. Fr. ser. 3, i. 84.

Sp. 13. F. SUBCASTANEUS, [♂, ♀] Westw. Ent. Mag. v. 263 .....Java.
Burm. Handb. v. 438.
Hope, Cat. Lucan. 7.

Sp. 14. F. MANILLARUM, [♂, ♀] Hope, Cat. Lucan. 26 .....Ins. Philipp.
angustatus? (Esch. MS.), Dej. Cat. 194.

Sp. 15. F. SCARITIFORMIS, [♂] Parry, Proc. Ent. Soc. 1862, p. 113..Malacca.
,, *ante*, p. 64.

Sp. 16. F. MODESTUS, [♂] Parry, Proc. Ent. Soc. 1862, p. 113..N. Zeelandia?

Sp. 17. F. LILLIPUTANUS, [♂, ♀] Westw. Tr. Ent. Soc. N. S. iii. 219, tab. xii. fig. 5 ..... N. Holl.
Clivinoides, Thoms. Cat. Lucan. 432.

Sp. 18. F. FISSICOLLIS, [♂] Fairm. Rev. Zool. 1849, p. 414.. Tonga Tabou, et Ins. Philipp.?
angustatus, Dej. Cat. 194 (*sec.* Fairm. Rev. Zool. 1849, p. 414)
Thoms. Cat. Lucan. 402.

Sp. 19. F. CAPENSIS, [♂?] Thunb. Mem. Soc. Nat. Mosc. i. 203 (Lucanus).....Cap. Bon. Spei.
Schönh. Syn. Ins. I. iii. 331.
Burm. Handb. v. 439.

Genus 5. CARDANUS, Westw. Ann. Sc. Nat. ser. 2, i. 112.
Syndesus, Gray, Griff. Anim. Kingd.
Eudora, de Cast. Hist. Nat. Ins. ii. 174.
Figulus, Dej. Cat. 194.

Sp. 1. C. SULCATUS, [♂, ♀] Westw. Ann. Sc. Nat. ser. 2, i. 113, tab. vii. fig. 3 ..... Java, Timor.
Burm. Handb. v. 440 (Figulus).
cornutus, Gray, Griff. Anim. Kingd. tab. xlvi. fig. 3 (Syndesus).
cornuta, de Cast. Hist. Nat. Ins. ii. 175 (Eudora).
cylindricus, Dej. Cat. 194 (Figulus).
asper, Sturm, Cat. Coleop. 137 (Figulus).

Genus 6. XIPHODONTUS, Westw. Ent. Mag. v. 260.
Coryptius, Dej. Cat. 194.
Cephax, de Castel. Hist. Nat. Ins. ii. 175.

Sp. 1. X. ANTILOPE, [♂, ♀] Westw. Ent. Mag. v. 260 (fig.).. Cap. Bon. Sp., Caffraria.
Burm. Handb. v. 430.
Capensis, Dej. Cat. 194 (Coryptius).
Sturm, Cat. Coleop. 347, tab. iv. fig. 3.
Reichii, de Cast. Hist. Nat. Ins. ii. 175, tab. vi. fig. 7, 8 (Cephax).

Fam. V. SYNDESIDÆ.

Genus 1. SYNDESUS, M'Leay, Hor. Ent. i. 104.
Hexaphyllum, Gray, Anim. Kingd. xv. 536.
Psilodon, Perty, Delect. Anim. Artic. 54.

Sectio I.

Sp. 1. S. CORNUTUS, [♂, ♀] M'Leay, Hor. Ent. i. 104 ..... N. Hollandia.
Westw. Ann. Sc. Nat. ser. 2, i. 114.
Latr. Cuv. Règne Anim. iv. 580.
Burm. Handb. v. 333.
Lacord. Gen. Col. tab. xxv. fig. 3.
Reiche, Ann. Soc. Ent. Fr. ser. 3, viii. 283.
Boisd. Voy. Astrolabe, 238.
de Castel. Hist. Nat. Ins. ii. 176.
cornutum, Fab. Syst. El. ii. 377 (Sinodendron).
parvus, Don. Ins. N. Holl. tab. i. fig. 4 (Lucanus).

Sp. 2. S. CANCELLATUS, [♂, ♀] Montrousier, Ann. Soc. Ent. Fr. ser. 3, viii. 283 (Ryssonotus) ..... N. Caledonia.
cucullatus, Thoms. Cat. Lucan. 403.

Sectio II.

Sp. 3. S. Brasiliensis, [♂, ♀] Gray, Griff. Anim. Kingd. 536, tab. xlvi. fig. 4 (Hexaphyllum Brasiliense) ..... Brasilia.
Westw. Ann. Sc. Nat. ser. 2, i. 115, tab. vii. fig. 1 ♂, 2 ♀.
Burm. Handb. v. 332.
Reiche, Ann. Soc. Ent. Fr. ser. 3, viii. 283.
Schuberti ♀, Perty, Voy. Spix & Mart. tab. xi. fig. 12 (Psilodon).
de Castel. Hist. Nat. Ins. ii. 176.

Sp. 4. S. æquinoctialis, [♂] Buquet, Ann. Soc. Ent. Fr. 1840, p. 375 (Hexaphyllum æquinoctiale)..N. Grenada, Santa Fè.
Westwoodii, Hope, Proc. Ent. Soc. 1840; Cat. Lucan. 1.
Burm. Handb. v. 332.

Fam. VI. ÆSALIDÆ.

Genus 1. CERATOGNATHUS, Westw. Ent. Mag. v. 260.

Sp. 1. C. niger, [♂, ♀] Westw. Ent. Mag. v. 261, cum fig. .. N. Hollandia.
Burm. Handb. v. 325.
furcatus, de Casteln. Hist. Nat. Ins. ii. 174 (Platycerus).
cornutus, Thoms. Cat. Lucan. 403.

Sp. 2. C. mentiferus, [♂] Westw. Tr. Ent. Soc. ser. 3, i. 434, tab. xv. fig. 5 ..... N. Hollandia.

Sp. 3. C. Westwoodii, [♂] Thoms. Cat. Lucan. 433.....N. Hollandia.
punctatissimus, Westw. Tr. Ent. Soc. ser. 3, i. 433, tab. xv. fig. 4.

Sp. 4. C. Helotoides, [♀] Thoms. Cat. Lucan. 434 ..... N. Zeelandia.
areolatum, Westw. Tr. Ent. Soc. ser. 3, i. 430, tab. xiv. fig. 2 (Sinodendron ?).

Genus 2. MITOPHYLLUS, Parry, Tr. Ent. Soc. iv. 55.
Ptilophyllum, Guér. Rev. Zool. 1845, p. 439.
Ceratognathus, Burm. Handb. v. 324.
Lacord. Gen. Col. iii. 41.

Sp. 1. M. irroratus, [♂, ♀] Parry, Tr. Ent. Soc. iv. 56, tab. i. fig. 4.. N. Zeelandia.
Hope, Cat. Lucan. 7.
White, Voy. Ereb. & Terror, tab. ii. fig. 3, 4.
Burm. Handb. v. 326 (Ceratognathus).
Lacord. Gen. Col. iii. 41, tab. xv. fig. 4 (Ceratognathus).
Godeyi, Guér. Rev. Zool. 1845, p. 439 (Ptilophyllum); Ann. Soc. Ent. Fr. ser. 2, iii. Bull. 97.

Sp. 2. M. PARRIANUS, [♂] Westw. Tr. Ent. Soc. ser. 3, i. 432, tab. xv. fig. 3 .....N. Zeelandia aut N. Caledonia?

Genus 3. CERUCHUS, M'Leay, Hor. Ent. i. 115.
Tarandus (Megerle), Dej. Cat. (1833).
Platycerus, Latr. Gen. Cr. et Ins. ii. 133.

Sp. 1. C. TENEBRIOIDES, [♂, ♀] Fabr. Syst. El. ii. 252 (Lucanus) ....Europa.
Panz. Faun. Germ. 62, I. 2.
Duftschm. Faun. Austr. i. 67.
M'Leay, Hor. Ent. i. 115 (Ceruchus).
Heer, Faun. Helvet. i. 497.
Dej. Cat. 194 (Tarandus).
Burm. Handb. v. 328.
Latr. Gen. Cr. et Ins. ii. 133 (Platycerus).
Gyll. Ins. Suec. ii. 68.
de Castel. Hist. Nat. Ins. ii. 173.
Schönh. Syn. Ins. I. iii. 328.
Silesiacus (var. min.), Dej. Cat. 194 (Tarandus).
Tarandus, Panz. Beitr. &c. i. 25, tab. iii. fig. 3, 5 (Lucanus).
Duval, Gen. Col. d'Eur. tab. ii. fig. 6 ♂, 7 ♀.
Mulsant, Lamell. de Fr. 597 (Ceruchus).

Sp. 2. C. PICEUS, [♂, ♀] Weber, Obs. Ent. 84 (Lucanus).....Amer. bor.
Fabr. Syst. El. ii. 252.
Thunb. Mem. Soc. Nat. Mosc. i. 202.
Schönh. Syn. Ins. I. iii. 327.
Burm. Handb. v. 329.
Americanus, Dej. Cat. 194 (Tarandus).
Balbi, de Casteln. Hist. Nat. Ins. ii. 174, tab. xvii. fig. 3, 4 (Platycerus).
quercicola, Sturm, Cat. Coleop. 136 (Tarandus).

Sp. 3. C. STRIATUS, [♂] Leconte, Proc. Ac. Nat. Sc. Philad. 1859, p. 85; *id.* Classif. Coleop. N. Amer. 121.....Oregone.

Genus 4. ÆSALUS, Fabr. Syst. El. ii. 254.

Sp. 1. Æ. SCARABÆOIDES, [♂, ♀] Fabr. Syst. El. ii. 254.....Europa.
Latr. Gen. Cr. et Ins. ii. 133.
M'Leay, Hor. Ent. i. 103.
Duftschm. Faun. Austr. i. 70.
Panz. Faun. Germ. 26, 15, 16.
Guér. Icon. Règne Anim. tab. xxvii. fig. 9.
Burm. Handb. v. 323.
Duval, Gen. Col. d'Eur. tab. ii. fig. 8.
Schönh. Syn. Ins. I. iii. 331.

Fam. VII. SINODENDRIDÆ.

Genus 1. SINODENDRON, Hellwig, Schneid. Mag. 391.
Ligniperda, Fabr. Syst. El. ii. 18.

Sp. 1. S. CYLINDRICUM, [♂, ♀] Linn. Syst. Nat. I. ii. 544, 11 (Scarabæus) ..... Europa.
Fabr. Syst. El. ii. 376.
De Geer, Mem. iv. 258, tab. x. fig. 2, 3 (Scarabæus).
Oliv. Ent. I. iii. 47, 54, tab. ix. fig. a, b, c.
Latr. Gen. Cr. et Ins. ii. 101.
Cuvier, Règ. Anim. tab. xlv. fig. 1.
Ratzeb. Forst. Ins. i. 87.
Heer, Faun. Helvet. 497.
Westw. Mod. Classif. Ins. i, 185, fig. 13, 18.
Mulsant, Lamell. de Fr. 60, tab. iii. fig. 10.
Burm. Handb. v. 320.
Duval, Gen. Col. d'Eur. tab. ii. fig. 9 ♂, 10 ♀.

Sp. 2. S. RUGOSUM, [♂] Mannerh. Bullet. Mosc. 1843, p. 262.. Oregone, California.
Leconte, Ent. Rep. Exp. Missis. p. 17; *id.* U. S. P. R. R. Exp. Surv. Zool. par. xlvii. p. 42, tab. i. fig. 15; Classif. Col. N. Amer. 1861.
Melsh. Cat. Coleop. U. S. p. 57.
Doué, Ann. Soc. Ent. Fr. 1857, Bullet. p. 19.

Sp. 3. S. AMERICANUM, [♂, ♀] Pal. de Beauv. Ins. Afr. et Amér. 192, tab. i. fig. 1, 2, 3..... Amer. bor.
Melsh. Cat. Coleop. U. S. 57.
Leconte, Classif. Col. N. Amer. 121.
Parry, *ante*, p. 65.
An species distincta, vel *S. cylindrici*, Linn., varietas?

Genus 2. DENDROBLAX, White, Voy. Ereb. & Terror.

Sp. 1. D. EARLIANUS, [♂, ♀] White, Voy. Ereb. & Terror, 9, tab. ii. fig. 9 ♂, 10 ♀ ..... N. Zeelandia.
Lacord. Gen. Coleop. iii. 15, tab. xxv. fig. 2.
Westw. Tr. Ent. Soc. N. S. iii. 213.
Erichs. Bericht. d. Ent. 1846, p. 49.
Parry, *ante*, p. 65.

SYNOPSIS.

COLEOPTERA PECTINICORNIA; DIV. LUCANOIDEA.

[The Species marked † are known to me by description only, and those marked * are not in my Collection.]

Fam. I. CHIASOGNATHIDÆ.

Gen. i. Pholidotus, M'Leay.

Sp. 1. *P. Humboldti*, Schönh.
2. *P. Spixii*, Perty.

Gen. ii. Chiasognathus, Steph.

Sp. 3. *C. Grantii*, Steph.
†4. *C. Jousselinii*, Reiche.
5. *C. Mniszechii*, Thoms.
6. *C. Latreillei*, Solier.
7. *C. Feisthamelii*, Guér.
8. *C. Prionoides*, Buquet.
9. *C. Lindenii*, Murray.
10. *C. Murrayi*, Thoms.
*11. *C. albofuscus*, Blanch.

Gen. iii. Rhyssonotus, M'Leay.

Sp. 12. *R. nebulosus*, Kirby.
13. *R. jugularis*, Westw.

Gen. iv. Cacostomus, Newman.

Sp. 14. *C. squamosus*, Newman.

Gen. v. Lamprima, Latr.

Sp. 15. *L. Latreillii*, M'Leay.
16. *L. aurata*, Latr.
†17. *L. splendens*, Erichs.
18. *L. rutilans*, Erichs.
19. *L. ænea*, Fabr.
20. *L. Micardi*, Reiche.
21. *L. varians*, Germ.
*22. *L. sumptuosa*, Hope.

Gen. vi. Streptocerus, Fairm.

Sp. 23. *S. speciosus*, Fairm.

Gen. vii. Colophon, Westw.

Sp. 24. *C. Westwoodii*, Gray.
*25. *C. Thunbergii*, Westw.

Fam. II. LUCANIDÆ.

Gen. viii. Mesotopus, Burm.

Sp. 26. *M. Tarandus*, Swed.

Gen. ix. Lucanus, Scop.

Sp. 27. *L. cervus*, Linn.
28. *L. Turcicus*, Sturm.
29. *L. orientalis*, Kraatz.
30. *L. laticornis*, Deyrolle.
31. *L. tetraodon*, Thunb.
*32. *L. Barbarossa*, Fabr.
33. *L. lunifer*, Hope.
34. *L. Mearesii*, Hope.
35. *L. Hopei*, Parry.
36. *L. Cantori*, Hope.
37. *L. villosus*, Hope.
38. *L. sericans*, Vollenh.
†39. *L. maculifemoratus*, Motsch.
40. *L. vicinus*, Hope.
41. *L. Westermanii*, Hope.
42. *L. Smithii*, Parry.
43. *L. Fortunei*, Saunders.
44. *L. atratus*, Hope.
45. *L. elaphus*, Fabr.
46. *L. capreolus*, Linn.
47. *L. lentus*, Casteln.

Gen. x. Rhætus, Parry.

Sp. 48. *R. Westwoodii*, Parry.

Gen. xi. Hexarthrius, Hope.

Sp. 49. *H. Forsteri*, Hope.
50. *H. Bowringii*, Parry.
51. *H. Rhinoceros*, Oliv.
52. *H. Buquetii*, Hope.
†53. *H. Chaudoiri*, Deyrolle.
54. *H. Mniszechii*, Thoms.
55. *H. Parryi*, Hope.
*56. *H. Deyrollei*, Parry.

Fam. II. LUCANIDÆ—*continued.*

Gen. xii. Odontolabis, Hope.

Sp. 57. *O. Vollenhovii*, Parry.
58. *O. Ludekingii*, Vollenh.
59. *O. Wollastonii*, Parry.
*60. *O. Mouhotii*, Parry.
*61. *O. Lacordairei*, Vollenh.
*62. *O. Burmeisteri*, Hope.
63. *O. Cuvera*, Hope.
64. *O. Delessertii*, Guér.
65. *O. Gazella*, Fabr.
66. *O. Dux*, Westw.
67. *O. carinatus*, Linn.
68. *O. bellicosus*, Casteln.
69. *O. Dalmani*, Hope.
70. *O. Stevensii*, Thoms.
71. *O. Dejeanii*, Reiche.
72. *O. Castelnaudi*, Parry.
73. *O. bicolor*, Oliv.
74. *O. Brookeanus*, Vollenh.
†75. *O. Sommeri*, Parry.
*76. *O. striatus*, Deyrolle.
77. *O. platynotus*, Hope.
78. *O. Cingalensis*, Parry.
79. *O. nigrita*, Deyrolle.
†80. *O. intermedius*, Deyrolle.
81. *O. æratus*, Hope.

Gen. xiii. Heterochthes, Westw.

Sp. 82. *H. brachypterus*, Westw.

Gen. xiv. Neolucanus, Thoms.

Sp. 83. *N. Baladeva*, Hope.
84. *N. Saundersii*, Parry.
85. *N. nitidus*, Saunders.
86. *N. laticollis*, Thunb.
87. *N. castanopterus*, Hope.
88. *N. Sinicus*, Saunders.
89. *N. cingulatus*, Parry.
90. *N. Championi*, Parry.

Gen. xv. Cladognathus, Burm.

Sp. 91. *C. Giraffa*, Fabr.
92. *C. Confucius*, Hope.
93. *C. Forficula*, Thoms.
94. *C. inclinatus*, Motsch.
95. *C. cinnamomeus*, Guér.
96. *C. castaneus*, Hope.
97. *C. foveatus*, Hope.

Fam. II. LUCANIDÆ—*continued.*

Gen. xv. Cladognathus—*contind.*

Sp. 98. *C. Maclellandi*, Hope.
99. *C. ciliper*, Thoms.
100. *C. quadrinodosus*, Parry.
*101. *C. Jenkinsii*, Westw.
102. *C. flavidus*, Parry.
103. *C. elegans*, Parry.
*104. *C. Wallacei*, Parry.
*105. *C. decipiens*, Parry.
106. *C. Lafertei*, Reiche.
*107. *C. assimilis*, Parry.
108. *C. Tragulus*, Vollenh.
109. *C. Bison*, Fabr.
110. *C. cinctus*, Montrousier.
111. *C. lateralis*, Hope.
*112. *C. Zebra*, Oliv.
113. *C. suturalis*, Oliv.
114. *C. occipitalis*, Hope.
115. *C. biplagiatus*, Westw.
*116. *C. inquinatus*, Westw.
*117. *C. attenuatus*, Parry.
118. *C. sericeus*, Westw.
119. *C. fulvonotatus*, Parry.
120. *C. bisignatus*, Parry.
121. *C. politus*, Parry.
122. *C. dorsalis*, Erichs.
123. *C. cavifrons*, Hope.
124. *C. approximatus*, Parry.
†125. *C. Buddha*, Hope.
126. *C. Dauricus*, Motsch.
127. *C. squamilateris*, Parry.
128. *C. perplexus*, Parry.
129. *C. Oweni*, Hope.
130. *C. forceps*, Vollenh.
131. *C. Spencii*, Hope.
132. *C. crenicollis*, Thoms.
133. *C. curvipes*, Hope.
134. *C. rudis*, Westw.
*135. *C. Downesii*, Hope.
136. *C. Savagei*, Hope.
137. *C. eximius*, Parry.
138. *C. serricornis*, Latr.
139. *C. Senegalensis*, Klug.
†140. *C. Antilopus*, Swed.
141. *C. quadridens*, Hope.
142. *C. Natalensis*, Parry.
143. *C. faber*, Thoms.
144. *C. modestus*, Parry.

Fam. II. LUCANIDÆ—*continued.*

Gen. xvi. Homoderus, Parry.

Sp. 145. *H. Mellyi*, Parry.

Gen. xvii. Cyclorasis, Thoms.

Sp. 146. *C. platycephalus*, Hope.
147. *C. Jekelii*, Parry.
148. *C. subnitens*, Parry.

Gen. xviii. Cyclommatus, Parry.

Sp. *149. *C. metallifer*, Boisd.
150. *C. Tarandus*, Thunb.
151. *C. Mniszechii*, Thoms.
152. *C. strigiceps*, Westw.
153. *C. affinis*, Parry.
*154. *C. Maitlandi*, Parry.
155. *C. faunicolor*, Hope.
156. *C. Dehaanii*, Westw.
157. *C. insignis*, Parry.

Gen. xix. Cantharolethrus, Thoms.

Sp. *158. *C. Luxerii*, Buquet.
*159. *C. Reichii*, Hope.

Gen. xx. Leptinopterus, Hope.

Sp. 160. *L. Fryi*, Parry.
161. *L. femoratus*, Fabr.
*162. *L. erythrocnemus*, Burm.
163. *L. tibialis*, Eschscholtz.
164. *L. melanarius*, Hope.
165. *L. Ibex*, Bilberg.
166. *L. V-niger*, Hope.
*167. *L. pulchellus*, MS. Mus. Berol.
168. *L. polyodontus*, Hope.
169. *L. rotundatus*, Parry.

Gen. xxi. Macrocrates, Burm.

Sp. 170. *M. Bucephalus*, Burm.

Fam. III. DORCIDÆ.

Gen. xxii. Hemisodorcus, Thoms.

Sp. 171. *H. Nepalensis*, Hope.
172. *H. Macleayii*, Hope.
173. *H. gracilis*, Saunders.
174. *H. piceipennis*, Westw.
175. *H. Passaloides*, Hope.

Fam. III. DORCIDÆ—*continued.*

Gen. xxiii. Ditomoderus, Parry.

Sp. 176. *D. mirabilis*, Parry.

Gen. xxiv. Eurytrachelus, Thoms.

Sp. 177. *E. Bucephalus*, Perty.
178. *E. Titan*, Boisd.
179. *E. Westermani*, Hope.
180. *E. platymelus*, Saunders.
†181. *E. Bubalus*, Perty.
182. *E. Tityus*, Hope.
183. *E. Saiga*, Oliv.
184. *E. cribriceps*, Chevr.
185. *E. purpurascens*, Vollenh.
186. *E. concolor*, Blanch.
187. *E. Thomsoni*, Parry.
188. *E. Reichii*, Hope.
189. *E. Niponensis*, Vollenh.

Gen. xxv. Dorcus, M'Leay.

Sp. 190. *D. Antæus*, Hope.
191. *D. Dehaanii*, Hope.
192. *D. Hopei*, Saunders.
193. *D. Parryi*, Thoms.
194. *D. Ternatensis*, Thoms.
195. *D. vicinus*, Saunders.
196. *D. submolaris*, Hope.
†197. *D. binervis*, Motsch.
198. *D. cylindricus*, Thoms.
199. *D. parallelus*, Burm.
†200. *D. brevis*, Say.
†201. *D. Mazama*, Leconte.
202. *D. parallelepipedus*, Linn.
203. *D. Musimon*, Gené.
*204. *D. Peyronis*, Reiche.
205. *D. Scaritides*, Hope.
206. *D. derelictus*, Parry.
*207. *D. Hydrophiloides*, Hope.
*208. *D. carbonarius*, Westw.
*209. *D. Pelorides*, Westw.

Gen. xxvi. Macrodorcas, Motsch.

Sp. †210. *M. rectus*, Motsch.
†211. *M. rugipennis*, Motsch.
†212. *M. striatipennis*, Motsch.
†213. *M. cribellatus*, Motsch.

Gen. xxvii. Serrognathus, Motsch.

Sp. †214. *S. castanicolor*, Motsch.

Fam. III. DORCIDÆ—*continued.*

Gen. xxviii. Gnaphaloryx, Burm.

Sp. 215. *G. Taurus*, Fabr.
216. *G. squalidus*, Hope.
217. *G. dilaticollis*, Parry.
218. *G. parvulus*, Hope.
219. *G. sculptipennis*, Parry.
220. *G. velutinus*, Thoms.

Gen. xxix. Ægus, M'Leay.

Sp. 221. *Æ. acuminatus*, Fabr.
222. *Æ. lunatus*, Weber.
223. *Æ. Kandiensis*, Hope.
224. *Æ. chelifer*, M'Leay.
225. *Æ. capitatus*, Westw.
226. *Æ. parallelus*, Hope.
227. *Æ. labilis*, Westw.
228. *Æ. lævicollis*, Saunders.
229. *Æ. Eschscholtzii*, Hope.
230. *Æ. platyodon*, Parry.
231. *Æ. blandus*, Parry.
232. *Æ. punctipennis*, Parry.
233. *Æ. serratus*, Parry.
234. *Æ. insipidus*, Thoms.
235. *Æ. impressicollis*, Parry.
†236. *Æ. inermis*, Fabr.
†237. *Æ. interruptus*, M'Leay.
†238. *Æ. politus*, Montrousier.
239. *Æ. Malaccus*, Thoms.
240. *Æ. Myrmidon*, Thoms.
241. *Æ. adelphus*, Thoms.
242. *Æ. glaber*, Parry.
243. *Æ. trilobatus*, Parry.

Gen. xxx. Alcimus, Fairm.

Sp. 244. *A. dilatatus*, Fairm.

Gen. xxxi. Platycerus, Geof.

Sp. 245 *P. Caraboides*, Linn.
246. *P. Caucasicus*, Parry.
247. *P. quercus*, Weber.
248. *P. depressus*, Leconte.
†249. *P. Oregonensis*, Westw.
†250. *P. cærulescens*, Leconte.
†251. *P. Agassii*, Leconte.
*252. *P. ebeninus*, Deyrolle.

Fam. III. DORCIDÆ—*continued.*

Gen. xxxii. Scortizus, Westw.

Sp. 253. *S. maculatus*, Klug.
254. *S. cucullatus*, Blanch.

Gen. xxxiii. Sclerostomus, Burm.

Sp. 255. *S. Bacchus*, Hope.
256. *S. femoralis*, Guér.
257. *S. Fairmairii*, Parry.
258. *S. Rouleti*, Solier.
259. *S. cælatus*, Blanch.
*260. *S. fasciatus*, Germain.
*261. *S. lineatus*, Deyrolle.
262. *S. plagiatus*, Burm.
263. *S. Lessonii*, Buquet.
264. *S. Philippi*, Westw.
265. *S. pallidocinctus*, Fairm. & Germain.
266. *S. vittatus*, Eschscholtz.
267. *S. costatus*, Burm.
268. *S. Neotragus*, Westw.
†269. *S. cruentus*, Burm.
*270. *S. signatipennis*, Deyrolle.
*271. *S. Ditomoides*, Westw.
272. *S. tuberculatus*, Solier.

Gen. xxxiv. Oönotus, Parry.

Sp. 273. *O. adspersus*, Bohem.

Gen. xxxv. Lissotes, Westw.

Sp. 274. *L. reticulatus*, Westw.
275. *L. Novæ-Zeelandiæ*, Hope.
276. *L. Cancroides*, Fabr.
†277. *L. subtuberculatus*, Westw.
278. *L. crenatus*, Westw.
279. *L. obtusatus*, Westw.
†280. *L. curvicornis*, Boisd.
†281. *L. Howittanus*, Westw.
282. *L. Menalcas*, Westw.

Fam. IV. FIGULIDÆ.

Gen. xxxvi. Nigidius, M'Leay.

Sp. 283. *N. grandis*, Hope.
284. *N. Bubalus*, Swed.
285. *N. Delgorguei*, Thoms.
286. *N. auriculatus*, Guér.
287. *N. nitidus*, Thoms.

Fam. IV. FIGULIDÆ—*continued.*

Gen. xxxvi. Nigidius—*continued.*

Sp. *288. *N. cornutus*, M'Leay.
289. *N. obesus*, Parry.
290. *N. lævicollis*, Westw.
291. *N. Madagascariensis*, Casteln.

Gen. xxxvii. Agnus, Burm.

Sp. 292. *A. egenus*, Burm.

Gen. xxxviii. Penichrolucanus, Deyrolle.

Sp. 293. *P. Copricephalus*, Deyrolle.

Gen. xxxix. Figulus, M'Leay.

Sp. †294. *F. sublævis*, Palisot.
295. *F. anthracinus*, Klug.
296. *F. nigrita*, Westw.
297. *F. lævipennis*, Montrousier.
298. *F. trilobus*, Westw.
299. *F. integricollis*, Thoms.
300. *F. regularis*, Westw.
301. *F. sulcicollis*, Hope.
302. *F. foveicollis*, Boisd.
303. *F. striatus*, Oliv.
†304. *F. confusus*, Westw.
†305. *F. laticollis*, Thoms.
*306. *F. subcastaneus*, Westw.
307. *F. Manillarum*, Hope.
308. *F. Scaritiformis*, Parry.
309. *F. modestus*, Parry.
310. *F. Lilliputanus*, Westw.
†311. *F. fissicollis*, Fairm.
†312. *F. Capensis*, Thunb.

Gen. xl. Cardanus, Westw.

Sp. 313. *C. sulcatus*, Westw.

Fam. IV. FIGULIDÆ—*continued.*

Gen. xli. Xiphodontus, Westw.

Sp. 314. *X. Antilope*, Westw.

Fam. V. SYNDESIDÆ.

Gen. xlii. Syndesus, M'Leay.

Sp. 315. *S. cornutus*, M'Leay.
316. *S. cancellatus*, Montrousier.
317. *S. Brasiliensis*, Gray.
318. *S. æquinoctialis*, Buquet.

Fam. VI. ÆSALIDÆ.

Gen. xliii. Ceratognathus, Westw.

Sp. 319. *C. niger*, Westw.
320. *C. mentiferus*, Westw.
321. *C. Westwoodii*, Thoms.
322. *C. Helotoides*, Thoms.

Gen. xliv. Mitophyllus, Parry.

Sp. 323. *M. irroratus*, Parry.
324. *M. Parrianus*, Westw.

Gen. xlv. Ceruchus, M'Leay.

Sp. 325. *C. Tenebrioides*, Fabr.
326. *C. piceus*, Weber.
†327. *C. striatus*, Leconte.

Gen. xlvi. Æsalus, Fabr.

Sp. 328. *Æ. Scarabæoides*, Fabr.

Fam. VII. SINODENDRIDÆ.

Gen. xlvii. Sinodendron, Hellwig.

Sp. 329. *S. cylindricum*, Linn.
330. *S. rugosum*, Mannerh.
†331. *S. Americanum*, Palisot.

Gen. xlviii. Dendroblax, White.

Sp. *332. *D. Earlianus*, White.

N.B. Through the kindness of J. Miers, Esq., F.R.S., &c., I have, since the preparation of this Catalogue, had an opportunity of examining the unique type-specimen of *Sclerostomus Ditomoides*, Westw., and believe it to be only the var. min. of *S. Neotragus*, Westw.—F.J.S.P., May, 1864.

Comparative View of the Number of Species of Lucanoid Coleoptera *possessed by the Authors of the following Catalogues at the periods of publication.*

	Species.
1845. Rev. F. W. Hope, Cat. Lucan., records	165
From which deduct those which have proved to be only the other sex of established species or mere varieties of development	37
Total	128
1862. Mr. James Thomson, Cat. Lucan., records	190
From which deduct as above	9
Total	181
1864. Major Parry, Cat. Lucan., records	332
From which deduct the desiderata to his collection, as notified in the Synopsis by the marks * and †	69
Total	263

Count Mniszech's collection probably contains about the same number of species as my own.

The following are the names of the formerly reputed species deducted as above from the Catalogues of Mr. Hope and Mr. Thomson :—

Rev. F. W. Hope.

Lamprima Schreibersii.
Tasmaniæ.
Lucanus Hircus.
nigripes ♀.
Americanus.
Hexarthrius falciger.
longipennis ♀.
serricollis ♀.
Metopodontus ungulatus.
omissus.
astacoides.
fraternus.
fulvipes.
Prosopocoilus speculifer.
piceipennis.
Sayersii.
Leptinopterus funereus.
sarcorhamphus.
Odontolabis serrifer.
angulatus.
Odontolabis tenuipes ♀.
Macrognathus Downesii ♀.
Parryi.
bulbosus.
Platyprosopus Chevrolatii.
punctilabris.
Blanchardi.
dubius.
incertus.
indeterminatus.
Dorcus Bengalensis.
curvidens.
lateralis ♀.
rugifrons ♀.
inermis ♀.
punctiger ♀.
subangulatus ♀.

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Mr. James Thomson.

Lamprima amplicollis.
Lucanus Pontbrianti.
Fabiani.
Cladognathus speculifer.
Eurytrachelus semirugosus.
diabolicus.
Dorcus exaratus ♀.
Sclerostomus leiocephalus.
Figulus Australicus.

9

EXPLANATION OF THE PLATES.

Plate I.

Fig. 1. *Odontolabis Mouhotii*, Parry, ♂.
2. ,, *Castelnaudi*, Parry, ♂.

Plate II.

Fig. 1. *Odontolabis Ludekingii*, Vollenh., ♂ var. med.
2. ,, *Wollastonii*, Parry, ♂.
3. ,, ,, ,, ♀.

Plate III.

Fig. 1. *Odontolabis Wollastonii*, Parry, ♂ var. max.
2. *Sclerostomus signatipennis*, Deyrolle, ♂.
3. ,, *lineatus*, Deyrolle, ♀.
4. ,, *fasciatus*, Germain, ♀.

Plate IV.

Fig. 1. *Hexarthrius Deyrollei*, Parry, ♂.
2. *Cladognathus attenuatus*, Parry, ♂.
3. *Neolucanus cingulatus*, Parry, ♀.
4. *Cladognathus decipiens*, Parry, ♀.
5. ,, *Zebra*, Oliv., ♀.

Plate V.

Fig. 1. *Ægus serratus*, Parry, ♂.
2. *Odontolabis Stevensii*, Thoms., ♂ var. max..
3. *Ægus impressicollis*, Parry, ♂.
4. *Mesotopus Tarandus*, Swed., ♀.
5. *Odontolabis Stevensii*, Thoms., ♀.

Plate VI.

Fig. 1. *Cladognathus sericeus*, Hope, ♂ var. max.
2. *Lucanus Hopei*, Parry, ♂.
3. *Cladognathus fulvonotatus*, Parry, ♂ var. max.
4. *Odontolabis Sommeri*, Parry, ♂.
5. ,, *Brookeanus*, Vollenh., ♂ var. max.

PLATE VII.

Fig. 1. *Cyclorasis subnitens*, Parry, ♂.
2. *Cladognathus Wallacei*, Parry, ♂ var. max.
3. ,, *bisignatus*, Parry, ♂ var. min.
4. *Leptinopterus Fryi*, Parry, ♂ var. max.
5. *Cladognathus bisignatus*, Parry, ♀.
6. ,, *Tragulus*, Vollenh., ♂ var. med.
7. *Ægus trilobatus*, Parry, ♂.
8. *Leptinopterus rotundatus*, Parry, ♂.
9. *Odontolabis æratus*, Hope, ♀.

PLATE VIII.

Fig. 1. *Odontolabis Vollenhovii*, Parry, ♂ var. max.
2. *Cladognathus flavidus*, Parry, ♂ var. max.
3. ,, *elegans*, Parry, ♂.
4. ,, *quadrinodosus*, Parry, ♂ var. max.
5. ,, *Lafertei*, Reiche, ♀.

PLATE IX.

Fig. 1. *Neolucanus Baladeva*, Hope (mandib.)
2. *Rhætus Westwoodii*, Parry, ♂ var. max.
3. *Neolucanus Saundersii*, Parry (mandib.)
4. *Cyclorasis Jekelii*, Parry, ♂.
5. *Hexarthrius Bowringii*, Parry, ♂ var. max.
6. *Cantharolethrus Luxerii*, Buquet, ♂.
7. *Hexarthrius Bowringii*, Parry (anten.)
8. *Rhætus Westwoodii*, Parry, (anten.)

PLATE X.

Fig. 1. *Ægus platyodon*, Parry, ♂ var. max.
2. *Lucanus Smithii*, Parry, ♂.
3. *Chiasognathus Mniszechii*, Thoms., ♂.
4. *Hemisodorcus Passaloides*, Hope, ♂.
5. *Cladognathus politus*, Parry, ♂.
6. *Heterochthes brachypterus*, Westw., ♀.
7. ,, ,, ,, ♂.
8. *Odontolabis Cingalensis*, Parry, ♂ var. max.
9. *Macrocrates bucephalus*, Burm., ♂.

PLATE XI.

Fig. 1. *Heterochthes brachypterus*, Westw., ♂ var. max.; 1*a*, outline of portion of the head; 1*b*, front of the head seen from the front; 1*c*, maxilla; 1*d*, mentum; 1*e*, mentum seen from within, with the labium and palpus; 1*f*, antenna; 1*g*, prosternum seen from beneath; 1*h*, ditto, seen sideways.
2. *Heterochthes brachypterus*, Westw., ♂ var. min.; 2*a*, outline of the side of the head; 2*b*, mandible.
3. *Heterochthes brachypterus*, Westw., ♀; 3*a*, the head; 3*b*, the eye, divided by the canthus; 3*c*, antenna; 3*d*, maxilla; 3*e*, mentum; 3*f*, labium and palpus.

PLATE XI.—*continued.*

Fig. 4. *Cladognathus rudis*, Westw., ♀ ; 4*a*, the head with one of the antennæ ; 4*b*, the eye half-divided by the canthus ; 4*c*, maxilla ; 4*d*, mentum ; 4*e*, labium and palpi ; 4*f*, prosternum ; 4*g*, the same, sideways.

5. *Sclerostomus Philippi*, Westw., ♂ .

6. *Homoderus Mellyi*, Parry, ♂ var. max., anterior part of body , 6*a*, the same, seen sideways.

PLATE XII.

Fig. 1. *Cladognathus modestus*, Parry, ♂ ; 1*a*, the left side of the head, with the clypeus ; 1*b*, the extremity of the right mandible ; 1*c*, the mentum, with the four palpi in situ.

2. *Cladognathus faber*, Thoms., ♂ var. max. ; 2*a*, ♂ var. min., head.

3. ,, *Buddha*, Hope, ♂ var. max.

3*a*. ,, ,, ,, ♂ var. min. (*C. Thibeticus*, Westw.)

4. *Cyclommatus Maitlandi*, Parry, ♂ var. max. ; 4*a*, side view.

5. *Ægus labilis*, Westw., ♂ ; 5*a*, the eye entirely divided by the canthus ; 5*b*, maxilla ; 5*c*, the mentum, lobes of maxillæ and palpi ; 5*d*, labium and its palpi.

6. *Ditomoderus mirabilis*, Parry, ♂ ; 6*a*, the clypeus and central tubercle of the front of the head ; 6*b*, the eye half-divided by the canthus ; 6*c*, terminal joints of the antennæ ; 6*d*, maxilla ; 6*e*, mentum and palpi.

II. *On the Formation of the Cells of Bees and Wasps.* *By* G. R. Waterhouse, F.Z.S., &c.

[Read 7th March, 1864.]

At a former meeting of this Society, a discussion having arisen respecting the theory of the structure of the cells of wasps, &c., I stated that I possessed the commencement of a hornet's nest—or rather of the *comb*—in which there were but three cells, and these only partially built: that these cells were so placed that each one came in contact with two others, and had two flat sides, the flat sides forming the common partitions between two cells; and that the remaining portion of each cell (being about two-thirds of the entire circumference) was circular at the opening.

I promised to exhibit this rudimentary condition of a hornet's nest, and was reminded of this promise by our ex-President at the last meeting. I now lay it before you (Pl. XIII. figs. 1 and 1*a*); but before I proceed to make any remarks respecting it, I am anxious to direct the attention of the members to other nests and cells of Hymenopterous insects; and especially to the very extensive collection of these interesting objects exhibited in the small room at the east end of the northern Zoological Gallery of the British Museum. Here will be found between three and four hundred nests of various kinds of bees, wasps, &c. These nests, and many others which I have had opportunities of examining, may be divided into three principal classes.

I. Nests formed in burrows in the ground, or in dead wood. They are very numerous, and the cells of which they are composed are either cylindrical or ovate, sometimes round, or nearly so.

II. Isolated cells, not deposited in such excavations, but merely attached to some foreign substance. They are frequently ovate, sometimes cylindrical and sometimes spherical—never angular.

III. Groups of cells more or less closely united, not deposited in excavations or burrows, but either attached to some foreign substance, or to a nest-covering made by the insects. Here the form of the cell is commonly hexagonal.

Now it is a striking fact that of these different kinds of nests

(aggregates of cells) or isolated cells, both groups of insects mentioned—bees and wasps—furnish all the different varieties above noticed. Bees and wasps, we must bear in mind, form two very extensive and distinct sections of the order *Hymenoptera*, distinguished by many important points of structure. Each of these great sections is divided into families and genera, also characterized by differences of structure. Here then are insects of two distinct great sections furnishing repetitions of similar architecture in the construction of their nests and cells; on the other hand, we find instances of species of the same genus building nests and cells which are very dissimilar, not only as to the structure, but as to the material used. In short, insects, very dissimilar in form and structure, build similar nests and cells, and insects of (*very nearly*) the same form and structure build dissimilar nests and cells. From this we may infer, either that the influence of the form and structure of the insect upon that of the nest and cell must be but of minor importance; or, that the differences in the structure of the nests and cells are more apparent than real. I entertain the latter idea, and nearly thirty years back, when called upon to write the article "*Bee*" for the Penny Cyclopædia, I endeavoured to show that there was a common principle in action in all insect architecture, viz., that of working in segments of circles; and that, so far as the hive-bee was concerned, the cells of that insect furnished no exception to the rule.

The theory propounded by me, in explanation of the form of the cell of the hive-bee, has been objected to by several able naturalists, since it will not serve likewise to explain the hexagonal form of the cell of the wasp or hornet, it being surmised that the same laws would govern the form of the cell in both cases.

In 1835, when I wrote the article alluded to, I was not acquainted with certain facts relating to the building of the wasp's nest, and when I learnt that a single female wasp constructed, in the spring time, a nest made up of hexagonal cells, I felt that the objection that had been raised against my views was a very serious one.

The leading idea with me, in respect to the cells of the honeycomb, was that of a number of insects working simultaneously (or nearly so) in a confined space; but, with the wasp, the case is different, and in fact, as I soon afterwards discovered, is precisely the reverse; for it is a single insect, in unconfined space, working simultaneously (or very nearly so) at many cells: that is, so far as the nest first formed by the female wasp is

concerned. The cells constructed later in the season by the neuter wasps, I have no doubt, come into the same category as the cells of the hive-bee.

Having made these preliminary remarks, I will now direct your attention to one or two other specimens which I have to exhibit. But first I wish you to observe, with regard to the specimen of part of a nest already exhibited, that it consists of a stalk by which it was attached to the nest-covering, the stalk being slender in the middle and expanded at the extremities—at the base to increase the surface for attachment, and at the opposite extremity to unite with the three cells. Viewing this specimen from the side, or with the stalk towards you, there is no trace of plane surfaces; all the work is in curves, and the partially formed cells appear to be hemispherical. It is only when you view it with the openings of the cells towards you that plane surfaces are visible, and these are presented by the flat partitions between the cells. You will also perceive that were the now partially circular outline of the opening of one of these cells to be carried on and completed, it would encroach upon the two neighbouring cells.

This specimen originally formed part of an enormous hornet's nest, the nest consisting, as usual, of a number of horizontal slabs composed of cells, and a thick covering enclosing the whole and constructed of the same materials as the cells. The covering, in parts, was very irregular, no doubt arising from the situation in which the nest was placed (most probably in a hollow tree). On its inner surface were many small cavities, in several of which were small rudimentary nests, or rather portions of comb. They were evidently not completed, on account of the confined space not permitting of further progress. It was from one of these cavities that the specimen exhibited was taken.

Here are two other small bits of comb from the small cavities spoken of. The cells are increased in number, but are less advanced than in the first piece. This (Pl. XIII. fig. 2), the smallest piece of comb, shows four cells in a rudimentary condition; the most advanced of these cells (and no doubt the one first commenced) is nearly hemispherical; attached to this is a second cell, rather less advanced, and in the interspace of these two cells are two others, presenting a still earlier condition. The smaller of these latter has its outer free portion nearly semicircular, whilst the inner half is formed by portions of the two adjoining cells, these portions presenting curves encroaching upon the small rudimentary cell. The partitions between the other three cells show a slight tendency to become flattened. Comparing this piece of

comb with the piece to which I first drew attention, it will be seen that the diameter of each of these rudimentary cells is less than that of the more advanced cells. The most advanced of the four cells is already half-surrounded by the adjoining cells.

This piece (Pl. XIII. fig. 3), from the same great nest, is still further advanced. It consists of a comparatively deep cell (*a*)—still, however, nearly hemispherical—and five other cells in different stages of progress, enclosing about five-sixths of its circumference. Viewing this piece (exhibiting the foundations of six cells) in connexion with the other pieces exhibited, and, again, with a piece of comb in a still more advanced state, where all the cells are of one diameter, and all (except the outermost series) are hexagonal, it seems to me impossible to avoid the conclusion that the deepest and most advanced of the six cells was the one first formed; that the cell next formed was this one, which, you will perceive, is rather more advanced than the other cells surrounding the first one, and that this little shelf (*b*), with a very gently concave inner surface, was the last work of the insect; it is the commencement of the sixth cell.

The work here is somewhat rude and irregular, as compared with that seen in cells more advanced in condition. For instance, this (*c*), which from its state of advancement must have been the fifth cell commenced, unlike the other cells surrounding the first one, does not come in immediate contact with it; at least, the partition between cell (*a*) and cell (*c*) is double the usual thickness. I have already described how the first cells constructed form, as it were, a mere expanded portion of the previously formed stalk. This stalk is more or less irregular, and in this particular instance it is strengthened by a lateral pillar, on the summit of which the fifth cell is commenced. Again, the axes of the cells surrounding the first cell are not equidistant. The centres of the shallow little cavities, presented by the earliest condition of the cells, are more approximated than in those which are more advanced; but of necessity, if the work is continued, the centres must be gradually shifted as the work proceeds, until the whole of the cells surrounding the first one shall have attained their full diameter. Then, the diameters of all the cells being equal, the circumference of cell 1 must admit of six other (and only six other) cells being joined to it.

I have still other points to notice in connection with this particular piece of comb. Here the first formed cell (or rather *part* of a cell, for we see no perfect cells in any of these specimens) is purely circular in its horizontal section, whilst the second and

third cells are separated by a flat partition. These are slight irregularities in the work, and I dwell upon them because I believe that it is only by bestowing close attention to such points that we shall arrive at any satisfactory solution of the problem furnished by the hexagonal form of the cells of these insects.

Lastly, I will notice, that notwithstanding the very small amount of work that has been bestowed upon these six rudimentary cells, there is still a small portion of another cell visible. This little shelf (*d*), which springs from the angle between two marginal cells, is clearly the commencement of a cell.*

* The pieces of comb just described are undoubtedly the work of the neuter insects. Mr. Smith, our best authority for all that appertains to the Hymenopterous insects, thus describes the early work of the female wasp:—"She begins by making three circular saucer-shaped receptacles, in each of which she deposits an egg; she then proceeds to form other similar shaped receptacles, until the eggs first deposited are hatched, and the young grubs require a share of her attention. From the circular bases she now begins to raise her hexagonal cells—not building them up at once, but from time to time raising them as the young grubs grow." See Proc. Ent. Soc. Lond. 1858, p. 35.

From certain specimens before me of the early work of the female wasp, I will make a slight addition to the above. These specimens, being forwarded for the purpose by Mr. Stone, were exhibited by Mr. Smith at our last meeting (in February; see Proc. Ent. Soc. 1864, p. 2), and are now again before you for inspection. They have kindly been placed in my hands for examination since their first exhibition. Amongst these specimens is a single isolated cell, or rather a commencement of a cell—it being the first one constructed by the insect. It is in the form of a low, hollow cone, the pointed end being attached to a small stalk, and is about one-eighth of an inch in height, and of the same width at its opening. Under a magnifying glass it appears to be built entirely of glistening, whitish, silk-like threads, which I have little doubt are a secretion from the insect, all the threads being firmly attached together as if they had originally been of a glutinous nature. Of two other specimens, one shows three low, hollow cones, each cone united to two others, and at their junction having flattish partitions. The third specimen shows four such cones, with flat partitions between them. The largest of these cones scarcely exceeds the first isolated cone in size, and there are some which are decidedly smaller. Under a lens the work appears rather rude and irregular, the apices of the cones not springing from the same level, and the so-called flat partitions only in a rude manner sketching out the future hexagon. These cells differ from those formed by the neuters, later in the season, in being of smaller size, and in apparently having no admixture of foreign substances (such as masticated dead or rotten wood, which appears to be most commonly used) in their composition; and I cannot help thinking that the extreme economy of material which is apparent in the spring nest formed by the female wasp, not only in the formation of the cells, but likewise in that of their covering, has connexion with the nature of the material used. Almost simultaneously with the commencement of the cells, it appears that the nest-covering is commenced. At first it has the appearance of a miniature umbrella, serving to shelter the rudimentary cells. As the cells progress so does the thin covering, by additions to the free edge, until, when com-

I will now call attention to some pieces of comb of another species of wasp, the *Vespa orientalis*. These specimens may be seen in the British Museum. Here the cells, instead of being built of minute fragments of wood, glued together by a secretion from the insect, as in the case of the pieces of comb of the common hornet which I exhibit, are built of clay, and the work is extremely beautiful and true. Under the same glass shade are three slabs of comb of this Indian hornet (a large piece and two small slabs); one of the small slabs is fractured in parts; the other is perfect, and this I will endeavour to describe, for if taken in connexion with what has already been said of the specimens exhibited, I think I shall then have directed your attention to some very important facts connected with the matter in hand.

This slab of comb is nearly round, rather more than two inches in diameter, and contains thirty-five cells in different stages of progress. Both surfaces of the slab are gently convex. All the cells form equilateral hexagons, excepting those which belong to the outer or marginal series. A few of the cells in the central part of the slab may be said to be complete, or very nearly so, having attained their full depth; and from the centre towards the margin the cells are successively less deep. Those on the margin, however, vary considerably in their depth, or, we may say, in their state of progress. Many of them have attained about half their full depth, and most of these are, at the opening of the cell, nearly true hexagons; each of them is in contact with four other cells, and each one of four of its sides thus forms a partition common to two cells. These sides meet so as to form true angles, but the two remaining sides of each cell, which as yet are not in contact with other cells, are less truly flat, and at their junction form a slightly rounded angle. Viewing these cells on the outer surface, we perceive that the imperfect angular form, which the cell has attained at its opening, rapidly disappears towards the base of the cell, which is rounded. Besides these half-formed cells, which have two free sides, there are two half-formed cells that are in contact only with three of the inner series of cells, and these two have three free sides each, which sides meet so as to form two slightly rounded angles at the outlet of

plete, it assumes a spherical form, but with an opening on the lowest part for the ingress and egress of the wasp. A second, and even a third covering successively follow, and are detached from each other. The largest of the nests exhibited by Mr. Stone is scarcely equal to a hen's egg in bulk, and the smallest is not larger than a medium-sized walnut.

the cell, which angles disappear towards the base of the cell, as in the other, much more common, form of half-constructed cells. The other cells of the external series are less advanced and show no trace of angles externally, the outline of the part not in contact with other cells being, in a horizontal section, in the form of a segment of a circle. These latter cells have not attained their full diameter.

I have now to refer to some other specimens which I exhibit; and, first, to two cells, which were constructed by a bee—*Osmia leucomelana*. They are formed of mud; and each cell is built separately. The female bee having deposited a small pellet of mud in a sheltered spot, between some tufts of grass, immediately commences to excavate a small cavity in its upper surface, scraping the mud away from the centre towards the margin by means of her jaws. A small shallow mud-cup is thus produced. It is rough and uneven on the outer surface, but beautifully smooth on the inner. On witnessing thus much of the work performed, I was struck with three points: 1st, the rapidity with which the insect worked; 2ndly, the tenacity with which she kept her original position whilst excavating; and, 3rdly, her constantly going over work which had apparently been completed; at every fresh addition of material brought up to the margin of the cell, the bee worked back again in the cavity which was already rendered smooth. To continue the cell, more material has to be sought for. It is added to the margin of the little cup first scooped out, and is wrought, by scraping, on the inner side; and here, again, it is certain that the bee does not entirely confine the work of her jaws to the additional material, but again passes them over the old work, and hence the part of the work already completed has a certain influence upon that which follows. The curves first formed have an influence upon those that follow, and, if continued, they would return again into themselves; that is to say, the cell would become a hollow sphere, but the tendency to this form is partially overcome by the fact that the cell has to be constructed by excavation, and by an insect which, when at work, is on the outside of it. The effect is, that it gradually passes from the spherical towards the cylindrical form, but never quite attains the latter, for the sides gradually close in, and ultimately the aperture becomes too contracted for the bee to insert her head and to carry on the work as before. Still fresh mud is added to the margin of the cell, but only to the inner edge, and this is continued horizontally,

ring after ring of mud, till the cell is closed in by a lid; the lid is excavated and rendered concave on its outer or upper surface, and is convex and rough on its inner surface, and, in fact, is a simple repetition of the first-formed portion of the cell, a part of a hollow sphere; and if the work proceeded beyond this point, there can be little doubt that this lid of a cell would become the bottom of another similar cell, and thus we should have the cells joined end to end, and with a common straight axis, as we see in the cells of certain other bees—*Megachile* for instance; here, however, the cells are deposited in cylindrical burrows made in the ground, and the cells themselves are cylindrical. I have witnessed the construction of the first part of the cell of the *Osmia*, and I have seen cells in all states of progress from that part to their completion. The completed *Osmia* cell strongly reminded me of the isolated cells built by the hive-bee for the queen-bee larva; the general form is the same to this extent,—they are both hemispherical at the base, and gradually approach the cylindrical form towards the mouth of the cell.

I have still one other form of cell, to which I wish to direct your attention. These two cells, like those of the *Osmia*, are constructed of mud, but the insect that formed them (a species of *Eumenes*) belongs to the wasp tribe. Whilst the *Osmia* is a short stout insect with short legs, the *Eumenes* is slender and has long legs. The cell of the *Osmia* would be completely filled by the pupa of the insect reared in it; but that of the *Eumenes* is much larger when compared with the size of the insect that constructed it. This difference in the proportionate size of the cells has, no doubt, reference to the kind of food which has to be stored up for feeding the larva. Furthermore, these cells differ from those of the *Osmia* in being almost perfectly spherical. They remind one of certain water bottles, and, like them, have a short neck, through which is the opening into the nest. The opening is very small, but I have little doubt would permit the insect to enter the cell; but, on the other hand, I much doubt whether she could perform the whole of the work of its construction from the outer side. I believe, indeed, that in executing the latter part of the work, at least, the insect was inside the cell. However this may be, here is a cell, the foundation of which was laid down in segments of circles of much larger size than those seen in the cell of the *Osmia*, and, in connexion with this, we have the fact, that the comparatively long legs of the *Eumenes* would give it the power of a far greater stretch, supposing that her work was com-

menced and carried on like that of the *Osmia*. In this case you observe there are two cells joined side by side; but as in other similar cells constructed by species of *Eumenes* which have come under my notice the cells are isolated,* there can be little doubt these two cells were constructed separately.

I compared the cell of the *Osmia* to that of the queen-bee of the hive, and I regret that I am unable to exhibit a perfect specimen of a queen's cell. On this piece of honeycomb, however, you will see two half-formed queen's cells, and I am anxious that you should notice the peculiarities in the work of the hive-bee in the region of these cells. In order to form a foundation for one of these large cells, it being attached to a very irregular surface, an abundance of wax is used. The foundation being formed, however, this superfluous wax is not allowed to remain, but the bees immediately commence its removal, and it is evident that many must be engaged in this work. The queen's cell is burrowed into in all parts. Where the wax is thinner, the surface of the cell is covered with little shallow, circular pits; where thicker, the pits are deeper and of larger diameter; and what is worthy of remark is, that these pits are very rarely confluent, they are separated by walls of the same height. Lastly, at the base of the cell where the wax is thickest, the pits have, some of them, assumed the hexagonal form of the ordinary cells, but they are of but little depth and apparently useless. Between these and the small pits first noticed, there are other pits showing every intermediate condition,—some partly rounded and partly angular, and in those that are angular, the number of straight sides is very variable. Here are two little pits having a common flat partition between them, but which are elsewhere circular. The bottoms of the pits, moreover, are either circular or angular; but, in all cases, it will be seen, upon examining them attentively, that wherever the pits are bounded by flat sides, the flat sides form the common partitions between themselves and adjoining cavities. This irregularity is not confined to the region of the queen's cells, but occurs frequently in other parts of the comb. In the pieces of comb on the table there are cells with five and with seven† sides: there are cells, which, instead of having three plates at the bottom,

* One of these isolated cells is figured by Mr. Smith in his "Catalogue of Hymenopterous Insects in the Collection of the British Museum." See Part V. *Vespidæ*, plate 6, fig. 7.

† Two specimens of 7-sided cells exhibited are cells of rather larger diameter than usual, and have surrounding them six cells varying slightly in size, and a small abortive seventh cell. The sides of the 7-sided cell are therefore unequal,

have but one plate; each of such cells being exactly opposed to one other cell on the opposite side of the comb.*

and it is only at the mouth of the cell that the seven sides appear. 5-sided cells are common, this being the usual form of the cells of the first-formed tier in the hive, cells which are on one side in contact with the roof of the hive, and are surrounded at other parts by four cells.

* In the British Museum is a nest of one of the slender-bodied wasps which is well worth examination in connexion with any theory intended to explain the form of the cells. The nest in question has its upper part dome-shaped, and is built round a stout stick. The under part is closed in by a thin covering, the outer surface of which is gently convex (excepting at one part, where a small area is depressed and slightly concave). It furnishes an extensive surface, being between seven and eight inches in diameter. A small opening is left in this lower envelope of the nest for the ingress and egress of the wasps. Nearly the whole of its surface is covered by a network of rudimentary cells, the average depth of the cells being about the eighth of an inch; those on the concave part, however, are much deeper. The cells covering the chief part of this area are truly hexagonal, and the bottoms of the cells are flat or *very* nearly so. Notwithstanding the beautiful regularity which prevails in this work, there are, in certain parts, some remarkable aberrations from the normal conditions. The most irregularly formed cells are those on the margins of the nest-covering. Here the lower edges of the dome-shaped upper and outer covering of the nest descend and hang down like a curtain, with an average width of about half an inch, which serves to protect the comb being constructed on the under covering of the nest, and which in time, had the structure proceeded, would itself have been inclosed. The cells which come in contact with this curtain are so built that the curtain forms their outer boundary, and most of them are pentagonal, but with very unequal sides, the partitions which separate them from each other being often twice, and sometimes three times as long as those which separate the marginal from the sub-marginal cells. These cells, moreover, are frequently confluent, some of the partitions which should have separated them not being carried up, but sketched out, as it were, by an indistinct ridge; in short, so variable are these marginal cells, that one may safely say there are no two alike. In other parts are some singular modifications in the forms of the cells. I will notice one particular cell and a few others that are near to it. This cell has six sides; two longer sides which meet as nearly as possible at a right angle, and one very short side. From this short side extend two sides of an adjoining cell, and these form part of the boundary of a cell with five unequal sides, two of which sides do not meet so as to form a true angle, for the angle is rounded (I so express it for brevity sake). From this rounded angle runs out one of those rudimentary partitions which merely sketch out the boundaries of what I have termed confluent cells. Again, joining the cell first noticed, and also adjoining each other, are two cells which are very nearly square, each having four long sides and one extremely short one; these again join a cell which has seven unequal sides. I will only further add, with respect to this nest that there is a considerable area round the thick stick which passes through the nest on which cells have not been commenced, and that nearly the whole of the cells which abut upon this area (and they are numerous) have their free margin rounded; in one or two only is the outer margin rendered angular.

Now the chief difference between the hive-bee's cell and that of the wasp is, that, in the former, the bottoms or bases of the cells are made up of plane surfaces; whilst, in the case of the wasp, the cells are hemispherical (or nearly so) at the base; never showing either angles or plane surfaces. And the difference in the slabs of comb made by the two insects is this: a slab of wasp comb consists only of one layer of cells; all the cells opening out in one direction; whilst the slab of honeycomb presents cells on both surfaces, those on one surface being united to those of the opposite side by their bases, and, consequently, the openings of the cells of the two sides of the slab are in opposite directions. When it is stated (as is often done) that, in this case, each cell is exactly opposed to three other cells, only the more common condition of the honeycomb is described, for there is considerable variation in this respect, as I have already shown; and the number of the plates of which the base of the cell is composed, as well as their form and proportions, is varied accordingly. This difference in the form of the bases of the wasp cells and that of the hive bee, connected, as it is, by contact of opposing cells, on the one hand, and non-contact on the other, furnishes a very striking fact in connexion with the subject under consideration.

But the cells of the honey-bee are not always angular at the base nor at the sides, as appears from certain experiments made by Mr. Tegetmeier. "*My first experiment*" (says this gentleman) "*consisted in placing a flat parallel-sided block of wax in a hive containing a recent swarm. In this the cells were excavated by the bees at irregular distances. In every case where the excavation was isolate it was hemispherical, and the wax excavated was added at the margin, so as to constitute a cylindrical cell. As other excavations were made in contact with those previously formed, the cells became flat-sided, but, from the irregularity of their arrangement, not necessarily hexagonal.*" *

The hexagonal cells I have been speaking of have for the most part been built under conditions which would not permit of the full diameter of the cell being carried out; but in the wasp comb, like that of the hive-bee, there are cells of larger size, which often appear quite suddenly, and extend over a considerable extent of surface: in the hive-bee they are known as the drone's cells. Upon measuring these carefully, I find that their average diameter is equal to that of the ordinary cells, if measured across the centre from

* See Report of the 28th Meeting of the British Association. "Transactions of the Sections," p. 132.

angle to angle, and I assume, therefore, that they are cells having the full diameter permitted by the stretch of the insect, as it ordinarily works in cell-building; such cells would merely touch each other were they cylindrical (whereas, in the smaller cells, the natural outlines would intersect), and there would be in their interstices a certain amount of superfluous material, which the instinctive propensities of the insects would lead them to remove; for, as I have before pointed out, their cells are carried up from the original foundation by adding material to their margins, and this is followed by *excavation* on the inner side.

I have now to speak of those cells on the margin of the wasp comb which are more or less angular on the outer side, and yet, at that part, are not in contact with other cells.

It has been stated that after the marginal cells have been carried up to a small extent the next work of the wasp is to commence other cells in the angles between each pair of these cells; thus converting the cells which were marginal into inner cells, and that then the sub-marginal cells become truly angular and hexagonal.

Let 1, 2 and 3 (Pl. XIII. fig. 4) be three partially constructed marginal cells; and let *a* and *b* be two cells commenced in the angles between them; it is clear that the work performed on the cells 1, 2 and 3 can no longer belong entirely to those cells,—they being continued by the insect almost simultaneously with the cells *a* and *b*. So much work as is bestowed upon cell 2 on its outer side must equally form part of the walls of cells *a* and *b*; and the work of cells *a*, *b* must in part belong to cells 1, 2 and 3. As these cells (*a* and *b*) moreover increase in size, part of the work in each must be common to the two, viz., at the point *d*, where they will become united. The force, then (I will so put it), that is thrown, for instance, on that part of cell *a* that comes in contact with cell 2, is met by another force in cell 2 at that part in which it is in contact with cell *a*; and the two forces are equal. If the cells 2, *a* and *b* are to be carried up together, there is no reason why any one should encroach on any other, but the contrary.

When the insect is at work with its head in cell *b*, there must be a certain time during which its work is bestowed on the part which is common to cell *b* and cell 2, and at another time it will be at work upon the part which is common to cell *b* and cell 3. It works, then, to the left and to the right equally, and we must suppose that the axis of its body is in the direction of the partition which separates cells 2 and 3; and, taking the size of the wasp and of its cell into consideration, we may add that its abdomen would be extended across another cell (4) behind these.

If cell *a* had been previously commenced, we can see that the work afterwards performed in cell *b* might be restricted on the side next that cell; but on the opposite side, which is not so restricted, the work is not laterally extended beyond the same point; and I infer from this, that when the insect is in the position mentioned (and there is no disturbing cause*), its power of stretch controls the diameter of the cell, as appeared to be the case with the *Osmia*. That from a certain point, which shall be, we will say, the centre of cell *b*, the stretch being in all directions equal from the centre, must describe a circle, and at the same time it must be equal, in each direction from the centre, to one side of a hexagon, the angles of which would touch that circle.

Cell-building consists of a constant repetition of similar work, and of similar parts of the work. Let us see what would be the effect of such repetition upon the cell 3. Cells 1, 2 and 3 are partly built and are marginal cells; cells 4 and 5 are within these, and are more advanced. The next operation, according to the usual course, would be to commence the building of cells *a* and *b*, the first atom of material laid down for these cells being in the angle between cells 2 and 1, or 2 and 3. The position of the insect in building cell *a* I suppose to be in the direction of the partition between cells 1 and 2 and across cell 5; that for building cell *b* would be in the direction of the partition between cells 2 and 3 and across cell 4. Cell 2, then, is enclosed at all parts, and has assumed a truly hexagonal form, and to complete this hexagon the insect has worked alternately in cell 2 and in cells *a* and *b*. But a repetition of part of the work would have produced the same effect on cell 2. The axis of the insect being in the direction *a* 5, and suitable for building cell *a*, the insect might work alternately inside and outside of a part of cell 2, and thus produce the straight partition between cell *a* and cell 2. Again, the position of the insect being altered, as it would be, to build cell *b*, that is in the direction *b* 4, by the same operation the partition between cells *b* and 2 would become straightened. At the same time the same position enables the insect to work alternately likewise in cells 3 and *b*, and to produce a flat partition between them. The inner half of the circumference of cell 3 has been converted into three sides of a hexagon; externally it furnishes two entering angles *d* and *e*. Let the work be repeated as before described,

* Under different conditions to those above indicated—as, for instance, in the construction of the nest-covering—the insect evidently does not keep its body fixed in position while at work. Here the work is performed with shifting centres, and segments of very large circles are exhibited in all parts of the work.

the insect working with the axis of its body in the same relative direction to the cells; say, first, in the direction *d* 2, and, secondly, in that of *e* 2; then two more flat sides to cell 3 may be produced by simple repetition of similar work; and, lastly, the side *f* 4 being now straight, furnishes a position through which the insect may operate upon the side which still remained untouched. Thus it is possible, by mere repetition of similar work under similar conditions, to alter a cell having a circular section into an hexagonal cell; the cell in question being only in contact with two other cells.

In the foregoing it is assumed that the wasp is at work on a plane surface—on a piece of comb in which the openings of the cells are all on the same level, and it brings about conditions which VERY NEARLY accord with those which actually present themselves.

The surface of the forming comb, however, is not a plane one, but is more or less convex, and the young cell on the margin of the comb, as I have had to point out, opens out obliquely, dipping away from the level of the next inner series of cells; and it is obvious in this case that the stretch of the insect would be more or less restricted. The insect, for example, which is at work in cell *a*, might reach to the right and to the left on the outer surface of cells 1 and 2, but it would only be to some point short of the centre of the exposed surface of cells 1 and 2, and something shorter than the side of the hexagon ultimately attained. And if the wasp were to work (as it very often will do) on the outer surface of a cell having the position of cell 2, but without having the adjoining cells *a* and *b* in contact, it would have the power of flattening the once-rounded outer wall, from the entering angle on either side towards, but not quite to, the centre of the free margin, and there would, therefore, be no true angle formed at that part; and this corresponds *exactly* with the conditions ordinarily presented.

I have now described the cells constructed by the wasp, and those of allied insects; and I have likewise described the cells of certain bees, and compared together the works of these two tribes of insects. In so doing I have endeavoured to set down the leading facts exactly as they present themselves, and not to be influenced by any theoretical views. Subsequently, I have endeavoured to harmonise those facts, and this part of the communication only, I think, can in any way be regarded as theoretical. Here I may, and probably have, erred in endeavouring to explain too much; but setting aside certain minor points, I

believe I have clearly shown that there is one common principle in action exhibited in the work of all these insects—I might include the work of other tribes of insects, or I might point to the works of other animals, the bird's nest for instance—and that is the principle of working in segments of circles: that the hexagonal form of the cells of certain bees and wasps may, and does, arise out of this mode of action when under certain conditions: that those conditions are, that the cells are so commenced that their natural circumferences, as the work proceeds, are either simply brought into contact with each other, or that the cells are so placed that the (we will say theoretical) circumferences must intersect. Contact with adjoining cells then is an essential condition to bring about the hexagonal form,* but for this result it is not necessary that a hexagonal cell should be completely surrounded by other cells.

* As I have before pointed out in this Society's rooms. See Proc. Ent. Soc. 1858, p. 17.

III. *On the Construction of Hexagonal Cells by Bees and Wasps.* By Frederick Smith, late Pres. Ent. Soc.

[Read 4th April, 1864.]

At the March meeting of this Society, Mr. Waterhouse propounded his theory of the construction of hexagonal cells by bees and wasps, and, supposing his to be the true solution of the problem, we are asked to accept it as explanatory of the manner in which all social insects form them. For years past I have had constant opportunities of examining nests of the social *Hymenoptera*, and I also formed a beautiful assortment of specimens for my own study; the result has been a conviction on my own part, that a different process obtains in different species; not that each particular species differs from all others, but that a variety of modes is observable amongst them in constructing hexagonal cells.

A mud-cell was exhibited to us by Mr. Waterhouse, and its mode of construction explained; whilst building this cell, the insect was stated to have always placed itself in one fixed position when at work, and the diameter of its cell was said to have been determined by the distance the insect could reach when thus at work. Now in that particular instance it no doubt was so; but had a hemispherical excavation of a similar diameter been made by a species of *Sphex*, by *Ammophila lutaria* for instance, that insect would have gone to work in a very different way. *Ammophila* is three times the size of the bee, but she would have moved round and round in different directions, until the same result was produced. Large insects frequently construct cells of smaller diameter than others built by smaller insects; and individuals of the same species may be observed at one time laboriously constructing cell after cell, whilst another is seen to avail itself of some ready-formed cavity, if equally adapted to its purposes. I am here alluding to solitary species; but I will show you this evening, that hive-bees will avail themselves of extraneous aid, and that if furnished with a series of pyramidal bases, they will readily erect hexagonal walls thereon; and I think you will see, that bees can form hexagonal-shaped cells without working in a circular direction at all, and

also without making circular excavations so close to each other as to necessitate the transformation into hexagonal cells, but which were intended to be cylindrical.

You were invited, at our last meeting, to arrive at the conclusion that all hexagonal cells were constructed in accordance with what is called the circular theory; that cell after cell arose from consecutively constructed hemispherical bases. An examination of a large number of nests has enabled me to ascertain that cells are constructed upon hemispherical, oval, pyramidal and also upon plane or flat bases. I have observed that cells are built upon bases consecutively formed, and also that the bases of entire combs are prepared before a single cell is constructed. Examples of each I shall lay before you, and having done so, I shall be much interested to have it shown, that all these various modes of building are in perfect accordance with the theory propounded to this Society at its last meeting.

Some writers upon the wonders of the hive have endeavoured to show that the hexagonal form of cell is, in some degree, necessitated for reasons that appear to me to have little weight. Saving of space is put forth as one! Surely not saving of space simply as such, without some collateral bearing, because the bees in a natural state are not constrained to occupy any particular-sized cavity. Then the saving of wax is supposed to operate, because wax is said to be a precious material secreted and elaborated in the stomach of the bee; and also in consequence of its being produced only by a certain class of working bees; but we must not lose sight of the fact, that hexagonal cells are not all built of wax; the scrapings of plants or of wood, used by many species of wasps, are not a scarce material; neither can mud, which is used by others, be said to be a precious or a rare material. Then as to the saving of labour, I cannot see that there is any better proof of this at all determining the desirability of the hexagonal-shaped cell; if honey-bees were left to their own resources, in localities to which they are indigenous, I believe that, like all other insects, they would just perform the amount of labour necessary to carry out the ends for which they are designed in nature; at the same time I see occasionally individuals of the same species, one labouring day by day in the construction of a nidus adapted to its purposes, whilst another avails itself of one ready made, but totally different in every respect to that formed by her laborious sister, but one that will answer her purpose; and in such instances I recognise a saving of labour. No, the hexagonal form of cell is the plan laid down by the

great Architect, and the bees are the builders that carry out His designs.

In the year 1858 this subject was brought before the Society by Mr. Tegetmeier, and at that time Mr. Waterhouse explained the nature of the circular theory, which, in his opinion, clearly elucidated the principle upon which all hexagonal cells are built by bees and wasps. My own observations on the mode of construction adopted by wasps, I found, in what was then assumed as essential to the formation of hexagonal cells, directly opposed, and I attempted, with such material as I at that time possessed, to combat the theory, which appeared to me inapplicable to the building of wasps; and I had the pleasure of finding, shortly afterwards, that one of our most intelligent inquirers held the same opinion.

Since that period Mr. Brown has advocated Mr. Waterhouse's theory in the "Zoologist," and the former gentleman assumes it as a fact, that no bee or wasp has been known to construct a single isolated hexagonal cell; contact with other cells, if I understand Mr. Brown rightly, being the essential condition which influences the hexagonal form; and if so, as regards complete cells, I take it for granted that it equally influences any portion of a cell that is raised into an isolated position; therefore I feel that I am warranted in assuming that no portion of a hexagonal cell can possibly be carried up above the surrounding cells, if the premises are infallible.

Mr. Brown gives it as his opinion, that "every cell during its progress is impinged upon by six other cells, and as all progress at the same time, the united attempts of the workers to avoid interspaces and to expend no more wax than is necessary to the making of firm walls, produce inevitably the hexagonal structure." Mr. Tegetmeier has given it as the result of his experience, "that the outer portion of each cell is cylindrical until a fresh cell is added on its outer side, when the cell becomes an inner one, and its outer sides transformed into a hexagon."

When this subject was last brought before the Society, I expressed my opinion to be, that the wasp commenced her comb with the intent instinctively to build hexagonal cells; since that time, I have had many opportunities of examining nests of wasps and bees, and the result is, if possible, a more confirmed belief in my original opinion. I shall have the pleasure of offering to your notice a number of most interesting examples of the architecture of wasps, and of pointing out the facts upon which my opinions are based; should I fail to prove my case to the satisfaction of a

single individual, I still think the exhibition of the different methods adopted by wasps in building their combs cannot fail to prove interesting.

It must not be supposed that all bees, or that all wasps, are equally skilful in constructing hexagonal cells; such is in fact far from being the case; some species, like unskilful masons, produce very unfinished or rustic work. This observation applies to wax-working bees, as well as to paper- and pasteboard-working wasps. The cells of *Trigona* are rude and unskilful in construction, when compared with the elegant and highly-finished structures erected by the hive-bee. Amongst the *Vespidæ*, the wasps belonging to the extensive genus *Polistes*, that construct cells of a papery consistency, are rude and unskilful in their work, when compared with those belonging to the genus *Chartergus*, which construct cells of stiff cardboard.

Wax is the material of which all honey-bees construct their cells; it is of a soft plastic nature, and is capable of being moulded, cut or scraped into any shape with ease; not so the pasteboard of wasps. The material of which the paper or cardboard is composed varies in different species; some use scrapings of sound timber, this is the case with the *Vespa Norvegica;* the nests of this wasp have a strength and durability adapting them for exposure to the vicissitudes of weather, being suspended to the branches of trees and shrubs; the hornet and other wasps, on the contrary, select decayed wood, consequently their nests are exceedingly fragile, and would soon perish if exposed. Many exotic wasps use materials of a vegetable nature, scrapings of the stems of plants; such is the material selected by pasteboard-working species; so firm and strong is the outer case, as well as the cells, of these wasps, that it is a difficult matter to tear them asunder. A few species build their pensile habitations entirely of clay, some nests being as much as eight or nine inches in diameter, and of an oblong, or egg-shaped, form; a specimen of an unfinished comb I shall lay before you.

We will now examine a little into the differences observable in the architecture of bees and wasps. Honey-bees, as you all know, build double combs, and these depend from the roof of the hive; the cells are consequently in a horizontal position. *Trigonæ* (stingless honey-bees) construct single combs; they are arranged horizontally, precisely like those of the common wasp, the mouths of the cells being consequently downwards; the combs, like those of the wasp, are supported by short columns of wax, or a material closely resembling wax, and of an equally soft

and ductile quality. Let me now direct your attention to the nests of various species of social wasps. The first which I will mention is the nest of *Icaria guttatipennis;* this is the nest to which I referred at a former meeting, as being figured in my Catalogue of the *Vespidæ*, and I incorrectly described it as being constructed of a single row of hexagonal cells; it consists of a double row, the number of cells being ten; I now direct your attention to the fact that all the cells are perfectly hexagonal, the exterior planes being as beautifully finished as those in contact with the inner planes of the opposing cells. I have placed a drawing of this nest (numbered 1) in the box on the table, and I particularly wish you to observe, that the first cell is carried up in a perfectly hexagonal form above the adjoining cells; a proof that, if wasps never build perfect isolated hexagonal cells, they certainly possess the capability of doing so. The exterior of all the cells, as I before observed, is hexagonal, not cylindrical until fresh cells are added on the outer side, as was observed to be the case in combs of the hive-bee by Mr. Tegetmeier. (See Pl. XIII. fig. B.)

I now invite observation to a nest, numbered 2, in the box of specimens; the portions exhibited are those of the exterior of a nest of *Nectarina Lecheguana*. The nest of this wasp is of globular shape, and is sometimes not less than sixteen or eighteen inches in diameter; the foundation is a single comb, inclosed in a globular envelope; *on this envelope* the wasps commence series of cells *on all sides;* these cells are covered in patches by envelopes,—the envelope always serving as the foundation of a fresh series of cells: a repetition of the above process, on all sides of the continually-increasing nest, results in structures such as I have described. Now you will observe, that all the cells constructed by these wasps are built upon the flat outer envelopes, and if you examine the specimens exhibited, you will see, in some instances, the faintest ground-plan of the hexagonal cell intended to be raised, traced on the flat foundation.

No. 4 is a portion of a nest of *Tatua morio*, perhaps the most interesting specimen that I offer to your notice; one that proves, to my mind, the primary intention of the wasp, instinctively to build cells with exactly six sides. *Tatua morio* is a pasteboard-maker; she constructs a bell-shaped nest, the outer envelope being very strong and tough; this would appear to be the first portion constructed, and next the flat floors upon which the cells are built; these floors are carried across the entire diameter of the nest, and attached to the outer envelope on all sides, each floor having a small circular opening left on one and the same

side, serving as a passage for the wasps from floor to floor, the entrance being at the bottom of the nest. I have sketched the section of one of these nests, and No. 4 in the box of specimens shows a portion of one of the floors, and also some unfinished cells. The nest sketched consists of nine chambers, all the floors are finished, but on the six upper ones only cells are constructed; a few are just commenced on the seventh. I have seen nests with cells on three floors only. In the nest sketched, the two lower floors are unoccupied, not a single cell having been commenced. In the box of specimens you will see one of these foundation floors without cells, and another upon which a number of the most beautiful hexagonal cells were in the course of construction. If the foundations of the planes of the exterior cells are examined, you will find one, two or more planes, clearly traced out as it were upon a ground-plan; if plans, so self-evident of intention, do not prove the instinctive purpose of the architect, I cannot imagine anything to my mind more perfectly conclusive. (See Pl. XIII. fig. D.)

It may not be known to some members of the Society, that in order to expedite the building of honey-combs, it is a common practice with bee-keepers in Germany to furnish hives with artificial foundations for the cells; these consist of sheets of wax, upon which is impressed a series of pyramidal hollows; in fact, the counterpart of a comb built by the bees themselves, entirely deprived of the cell-walls; and it is from such a piece of comb that the casts for the artificial foundations are obtained. A piece of casting of this description I lay before you, and I particularly call your attention to the commencement of the outer cells; you will see, in some instances, a single plane of the hexagonal cell commenced, in others two or three are in progress; here you have a ground-plan supplied, or, I may say, the foundations of the habitations ready prepared, upon which the labourers are to raise the walls, and you may see how admirably they have done it. Instinct enables the bee to construct hexagonal cells without teaching, and, we are told, in one undeviating manner. Surely the example before us exhibits an amount of intelligence on the part of the bees in availing themselves of such adventitious aid. Must we not henceforth, when speaking of the marvels of the hive or the vespiary, erase from our vocabulary such terms as blind instinct; and must we not cease to stigmatize the bee as a mere machine?

Before passing on to other considerations, let us here ask ourselves, what assumption naturally arises in the mind when we see,

as on the sheet of artificial bases exhibited, that the bees have at once availed themselves of this adventitious aid? does it not almost naturally occur to us, that these hexagonal ground-plans must be exactly such plans as they are accustomed to erect their hexagonal cells upon? does it not impress upon our minds the possibility, and even something more than that, the probability, that in whatever manner bees first commence their work, for instance, by making cylindrical excavations, does it not appear almost certain, that the bases of several cells are formed, and that each is perfectly pyramidal in shape, before a single wall is commenced? Such must be the conclusion arrived at by all who believe that insects can only work in one direction, and I think it must be admitted, that the very fact of the bees at once accepting the plan furnished, argues strongly in favour of the supposition that bees, when left entirely to their own resources, construct a precisely similar basement.

I would now direct attention to a large piece of a comb of the common wasp, *Vespa vulgaris*, and also to another of drone cells of the hive-bee, *Apis mellifica*, and I would point to a very marked difference in the construction of the cells; those of the hive-bee have always, whether finished or unfinished, a thickened rim of wax, the sides of the cells themselves are so thin and brittle that a constant traversing of the working bees over them would otherwise break and more or less destroy them. It is quite evident then, that whenever an addition is made to the height of a cell, this thickened rim must be scraped down to the same thinness as the planes of the hexagon beneath. This rim is always found on the cells, even when no further addition is intended to be made.

The wasp, you will observe, never requires a strengthening rim, the walls of her cells are carried up in hexagonal planes, to me, as evidently as if constructed by the hand of a mason.

Does then the fact of the bee always adopting the thickened rim indicate a different process of building, whereby the hexagonal-shaped cell is ultimately produced? or is it simply a necessity for insuring the safety of her work? Had it been removed when the cell was finished, I should have been led to suppose, that the cells of the hive bee were built by a different process; but, as it is always present, it rather appears to indicate the necessity of the rim as a mode of securing and strengthening the work.

So much, indeed, does the hexagonal principle appear to guide wasps in their operations, that one species, *Apoica pallida*, not only builds hexagonal cells, but she also, occasionally, constructs the entire comb itself of a hexagonal shape; now, here is no

compelling power, here are no adjoining circular combs, forcing the production of this particular hexagonal-shaped comb; the comb of this wasp consists of a single layer attached to trunks or branches of trees, &c., without any exterior envelope. I cannot, when I see such beautiful examples of the architecture of wasps, come to any other conclusion, than that, in instances such as the one I have just mentioned, it was the intention of the wasps to build hexagonal-shaped combs, and also their intention that those combs should consist entirely of hexagonal-shaped cells.

I direct your attention to a small nest of *Polistes tepidus;* this nest appears to illustrate, and to establish as a fact, a supposition that has frequently occurred to me, namely, that the development of the larvæ of *Hymenoptera* to the perfect condition must be a process much more rapidly carried on in tropical countries than in temperate ones, and that this rapidity of development necessitates the more rapid construction of those cells in which the first eggs are deposited. The nest before you, I think, is an exemplification of this idea: five cells are completed, each having served as the nursery of a wasp; twelve additional cells are commenced, and are in different stages of progress. Now I would call your attention to one fact, that the circumference of the unfinished cell is not carried up equally, or to the same height on all sides; you will observe that the two planes of each hexagonal cell that attach the unfinished cells to the finished ones are elevated obliquely considerably above the other planes; when any cell is carried up to the height required, all the planes have an equal elevation; therefore, it is clearly the case that the two inner planes that attached the unfinished cells to the finished ones must be first completed, leaving the two outer planes to be finished afterwards. This mode of construction is never, so far as my observation enables me to judge, to be observed in combs built by a populous community; in such cases, all the sides of the cells are carried up simultaneously.

I also exhibit a comb of the common wasp, *Vespa vulgaris* (No. 8), it is exceedingly interesting from the fact of its consisting of cells of different sizes; about three-fourths of the comb are occupied by cells of workers; at this stage of formation it became necessary to construct cells of a larger diameter adapted for females; this could not have been effected at once without a total disarrangement of their usual beautiful uniformity, but it could be done by degrees; thus we find the bases of about four rows of cells elongated, the parallel planes of the hexagons being also elongated, and thus by degrees the enlargement of the cells is

effected. The cells beyond the intermediate elongated ones will be found to be regular hexagons of the increased dimensions required. When I see such a departure from the usual mode of building as this, I recognize an intelligence that forces me to acknowledge in the wasp a creature that evidently designs an end to be accomplished, not a creature that would instinctively construct cylindrical cells, but whose labours always eventuate in the production of hexagonal ones, this result being dependent upon uncontrollable circumstances which always present themselves. (See Pl. XIII. fig. C.)

Five years ago, when the circular theory was brought before this Society, it did not appear in the same guise as now; it was then surrounded by certain collateral conditions, which I was led to believe were corner-stones of the ingenious edifice. Combination of labour was deemed essential, and at one period it was supposed that no solitary bee or wasp could construct hexagonal cells; this latter supposition proved to be a fallacy when I instanced the queen wasp as a solitary builder. In 1862, the Rev. Samuel Haughton, in a paper read before the Natural History Society of Dublin, says the hexagonal form of cell "may be accounted for simply by the mechanical pressure of the insects against each other during the formation of the cell. In consequence of the instinct that compels them to work with reference to a plane, and of the cylindrical form of the insects' bodies, the cells must be hexagons." This theory is, I think, at once disproved by the instance of the solitary wasp.

Another condition, essential (as I understood it) to the stability of the circular theory, was that no cell could possibly be constructed of the hexagonal form into which the builder could not insert its head. I exhibit the foundation comb of a wasp, and also the insect that constructed it (No. 6 in the box of specimens); I have taken off the head of the wasp and placed it over one of the cells, in order to show the impossibility of its being inserted.

The next condition that formerly existed was a circumstance that was supposed to regulate or determine the width of the planes of the hexagon; the explanation was this—a working bee was supposed to place itself exactly opposite the centre of one of the planes, and then fixing itself steadily in the proper position, the width of the plane would be the exact distance that the bee cut or reached with its mandibles when turning its head as upon a pivot. Now this at first sight appears a very ingenious solution; apparently it accounts admirably for the uniform exactitude observable in the width of all the planes; the uniformity of size in

the bees themselves also appears to add to the completeness of the theory; but it soon occurs to us that the same bees afterwards construct the larger cells of the drones. And we are no better off if we look into the nest of the wasp, for we find the large queen constructing the small cells of the workers, and the workers constructing the large cells of males and females.

I shall only mention one other position, still, I believe, upheld by the adherents to the circular theory; it is that no bee or wasp ever builds an isolated hexagonal cell, or a cell of hexagonal form carried up above the adjoining cells. If you examine the nest of *Icaria guttatipennis*, and also that of *Polistes Tasmaniensis*, both of which are exhibited, I think you will be satisfied that instances to the contrary are before you. I would also invite attention to a nest of *Vespa Norvegica* (No. 7), in which a central hexagonal cell is only raised to about one-third of its intended height, and has only four planes of the hexagon impinged upon by adjoining cells, the fifth and sixth cells not being commenced; this example will prove that the hexagonal form does not necessitate the impingement of six adjoining cells for its production, a position that has been laid down as being absolutely necessary.

No doubt it will be said that I have not shown the principle of the circular theory to be inapplicable to the construction of all hexagonal cells, but I contend that I have done so in several instances—in the nests of *Nectarina Lecheguana* and of *Tatua morio*, both wasps that erect hexagons upon flat bases; I have pointed out the fact that the commencements of single planes of the hexagon are to be found, in other cases of two or of three planes, and these beginnings exhibit not a trace of the circle any more than one, two, three or more pieces of masonry. I have shown that the bases of the cells of the common wasp, that constructs her cells upon consecutively formed bases, are hemispherical; in the hive we know they are pyramidal; and the bases of the transition cells, from those of the worker-wasp to those destined to contain females, partake more or less of the oval form.

Mr. Brown in his Essay remarks that "hive-bees produce their ordinary comb-cells by the united efforts of many individuals. Owing to this circumstance, and also to their never building up cells at the margins of combs unflanked by the foundations of other cells, they afford us, when so employed, no opportunity of observing the fundamental scheme upon which they build." My opinions are formed entirely upon observation of different modes of building; my conclusions have been forced upon me by facts,

in my opinion, conclusive of the primary intention of the builders to erect hexagonal cells.

I have examined nests of wasps in every stage of progress; I have found some species laying a separate foundation for each cell, wasps as well as bees; I have found some species of wasps constructing the entire foundations of a complete comb before a single wall of a cell was erected; and I see bees furnished with a complete floor of artificial foundations, at once adopting this adventitious aid. Then, again, I observe in nests of *Tatua morio*, and of some other species of wasps, the walls of one, two, three or more planes of the hexagon more or less raised; and, under these circumstances, what is the conclusion at which I naturally arrive? Why that all hexagonal cells are not constructed upon a circular principle, and that the primary idea of all social bees and wasps is not to produce cylindrical cells with hemispherical bases. I know not whether any one besides myself has arrived at a similar conclusion, or whether I stand alone in the opinion I have endeavoured to explain.

Addendum.—It having been suggested that the nest of *Icaria guttatipennis*, of which I could only exhibit a sketch, might possibly be only the portion of a nest in a state of demolition, I have re-examined it, and can vouch that such is not the case; only a few of the cells being carried up to their full height and lined with the *exuviæ* of the larva. It has also been stated that wasps are well known to destroy their old nests; such a circumstance is quite unknown to me, and I do not remember to have heard such a statement previously made.

In order to place clearly before my readers the fact of *Icaria* building hexagonal cells with exterior portions of the cells angulated, I have had a drawing of a nest of another species made, in which none of the cells are carried up to the required height. (See Pl. XIII. fig. A.) All the nests of this genus of wasp appear to be constructed in the same manner, the sharpness and beauty of the hexagon varying according to the skill of the particular species.

I exhibited a nest of *Polistes Tasmaniensis* in which a single cell was carried up above the surrounding cells, and it has been objected to as not being perfectly hexagonal: I have already stated that all bees and wasps are not equally skilful workmen, these belonging to the genus *Polistes* being instanced as "rude

and unskilful;" I admit that the elevated portion of the cell is not perfectly sharp and angular at the corners, but it is sufficiently so to prove the truth of my assertion. I recall attention to the cells of *Icaria*, which are exteriorly perfect in form, true hexagons, and I direct attention to the cells, particularly the exterior ones, in the figure of the nest of *Tatua morio;* it is to these I would point, and not to the least perfect example, as proofs of the fact of some species of wasps finishing the exterior portions of their cells in a perfectly hexagonal shape.—F. S., July, 1864.

IV. *On the Reversion and Restoration of the Silkworm.* By Captain Thomas Hutton, F.G.S., of Mussooree, N. W. India. (Communicated by Mr. Frederic Moore.)

[Read 2nd May, 1864.]

Introductory Remarks.

For many years past the utmost anxiety has prevailed on the European Continent, and more especially in France, in regard to the condition of the common silkworm, known to science as the *Bombyx Mori*, the constitution of the worm appearing to be so thoroughly weakened and undermined, by diseases arising from a long and uniform course of domestication, bad nourishment and other prejudicial influences, as to excite the most lively apprehensions lest the insect should suddenly become extinct.

That such apprehensions are far from groundless may be seen in the fact that one form of disease by which the worm is attacked, known in France as "*la muscardine*," is said by M. Guérin-Méneville annually to destroy more than *one-fourth* of the worms; and it has been clearly shown by this eminent Entomologist, and by several experienced cultivators of silk, that the crop has, within the last ten years, dwindled down to about one-half of what it used to be.

Various remedies have, of course, from time to time been tried for the purpose of arresting the progress of disease, sometimes with partial and temporary effect, but more generally without any success at all.

In consequence of these maladies, and their inability to arrest them, the French, with prudent and praiseworthy foresight, are using every possible means to introduce and acclimatize other species, which may, in some measure, fill the commercial void which would be created by the loss of the common silkworm.

Under these circumstances it occurred to me, that while assisting our continental neighbours in the introduction of such wild species as occur within our Western Himalayan forests, I might as well at the same time endeavour if possible to reclaim and restore to health the most valuable species of the whole; and, consequently, for several years past I have studied and experimented upon the *Bombyx Mori* and its domesticated congeners, with a degree of success which I now purpose to unfold.

In experimenting upon the worm I have not confined my efforts within the narrow limits of an endeavour to cure particular phases of disease, but to effect a permanent benefit in the restoration of a healthy and vigorous constitution, which, if accomplished, as I think it may be, will of itself not only cast out this or that particular phase of disease, but all the diseases under which the worm is now labouring; and I am fully convinced that until such radical change has been wrought, it will be but time and labour thrown away to seek to cure particular maladies as they appear.

Hitherto the results of my experiments have been such as to warrant my entertaining the most sanguine hopes of ultimate success, provided the same system be carried on for a few years longer, when it will of course depend upon the cultivator to maintain the advantages thus secured.

Of all the groups comprised within the family of the *Bombycidæ* that in which the genus *Bombyx* is contained, is, perhaps, in a commercial point of view, the most interesting and the most valuable. This genus contains, besides a few wild indigenous species widely scattered over the continent of India, all those long domesticated species popularly known as "*silkworms*," which were centuries ago imported into Europe from the northern provinces of China, where for many centuries previously they had likewise been kept in a state of domestication.

Having, however, already, in a paper entitled "Notes on the Silkworms of India," entered somewhat fully into the history of the Chinese species, I need not here travel over the same ground, but shall call attention to facts not previously noticed, and endeavour, after exposing the folly of insisting, as some still obstinately do, upon the healthy and vigorous constitution of the insects, to show by how very simple a method the worms may be induced to *revert* from their present artificial and moribund condition to one of vigour and permanent health.

Discovery of the Silkworm.

According to the commonly received chronology the discovery of the silkworm in China was made about the year B.C. 2640; and the means of reeling off, or unwinding the fibre from the cocoon, being also discovered, the regular domestication of the insect at once commenced.

Whether the species then discovered was, in reality, that to which naturalists have since assigned the name of *Bombyx Mori*, or whether the discovery of more than one species then occurred, we have now no means of positively ascertaining; nor, indeed, does it

much signify, as for the present, at least, it is with that known and cultivated in Europe as an annual that we have to deal; but from a paragraph quoted by Mr. F. Moore from the "Account of the Ceremonies of the China Dynasty," it would appear as if more than one species was under cultivation at the time when the "Account" was written, inasmuch as it contains an allusion to a second crop of silk, when it says,—"the officer who adjusted the price of horses forbad the people to rear a second breed of silk-worms in one season." Now, whatever the *Bombyx Mori* may be when cultivated in Cashmere, Persia or Europe, it may undoubtedly be made, in a suitable temperature, to produce an autumnal brood; this, however, refers to the worm after having been submitted to my experiments for two or three years, and when, indeed, it may be said to be fast travelling back to a state of nature. The same thing occurs likewise with regard to another species which is also an annual, as far as I can learn, in all countries, except Mussooree, in the Western Himalaya; this is the *Boro Pooloo* of Bengal, and *Bombyx textor* (nobis), which, like the *Bombyx Mori*, yields an autumnal crop when treated in a particular temperature. This fact, indeed, has led some people to declare that the two are but varieties of the same species, and that in a state of domestication all may, by the application of certain temperatures, be made to yield several crops of silk annually. This, however, may fairly be denounced as pure nonsence, the occurrence of the two crops arising solely out of the fact of our having in autumn a recurrence of the spring temperature, or what may be called a double season. Hence, since a particular degree of temperature causes the egg to hatch, whenever the season returns in which that temperature is produced, the young worm is of course excluded from the egg. It is quite possible then, and even probable, that these species may originally have done the same in their native country, and the reason why they have ceased to be double-brooded in Europe and other localities is to be attributed solely to the uncongenial temperature, which is sometimes too high, at other times too low; and with respect to those species which are termed "monthly" worms, if it were really the case that the number of crops is due to cultivation in warm climates, it ought to follow that, when domesticated in a cold climate, the frequent succession of silk crops should become less frequent, and the worm give symptoms of reverting to its old habits. Such, however, I have not found to be the case; for although I have succeeded in obtaining two broods from *Bombyx Mori* of Cashmere and *B. textor* of China, yet the small monthly China worm

(*B. Sinensis*, nob.) has continued yielding crop after crop even to the middle of December, when the eggs were again deposited in a temperature of 53° of Fahrenheit. Hence I adhere with good reason to the opinion that all are naturally distinct species. Consequently, as all the other accounts, quoted by Mr. Moore and other authorities, lead to the conclusion that one spring crop only was produced by the worm originally cultivated in China, it will be well to allow the annual species domesticated in Europe as *B. Mori*, to retain that distinctive title, more especially when we consider that as the people were forbidden to rear—not merely *a second crop of silk*, but—"*a second breed of worms*," the stock, if double-brooded, would speedily have been destroyed and lost by such interdiction. This, then, would tend to prove that the worm under cultivation was an annual only, and that the prohibition extended to other species.

Introduction into Europe.

From the year before Christ 2,640 until 550, or thereabouts, of the Christian era, the domestication of the worm appears to have been exclusively confined to China, severe punishments being inflicted upon any one who ventured to attempt its exportation into other countries, when, at length, about the latter year, through the laudable zeal of missionary monks who had visited China and there learnt the mode of cultivation, the eggs were secretly conveyed into Europe and presented to the Emperor Justinian.

Constitution impaired by Domestication.

Thus, for a period of more than 3,000 years, the so-called cultivation of the worm had remained exclusively in Chinese hands. What wonder, then, if the constitution of the insect had during that time been gradually undermined by a course of imperfect feeding, close and tainted atmosphere and various other enervating causes, until, at length, when imported into the West, it no longer retained its natural vigour, health and original characteristics, but had become enfeebled, degenerated and sluggish, by a long system of interbreeding with debilitated stock, and rendered liable, by the loss of constitution, to a multitude of diseases!

From the time of its introduction into Europe, the treatment it has experienced has been, with some modifications, nearly the same as that pursued in China; so that for an uninterrupted period of no less than 4,500 years, the worm has had to contend against all those unnatural and purely artificial influences arising from a state of domestication, which we erroneously persist in

terming *cultivation*, without one single renewal or infusion of the original healthy and natural stock from which the race has descended! Truly has it, as Darwin would say, undergone "the struggle for existence!"

One would almost be tempted to think, that the object of cultivators had actually been the destruction of the insect, for in what other department would breeders so long have neglected to infuse new blood into their domestic stock? Is it not a well understood and long-established fact, that, whether among animals or plants, an occasional renewal of seed and re-infusion of the original stamina is found to be absolutely necessary for the preservation of health, and of that particular standard of perfection which it is thought desirable to maintain? And yet with the domesticated *Bombyx Mori*, this necessary precaution has been uniformly neglected for 4,500 years! What wonder, then, that under the combined effects of bad and scanty food, want of sufficient light and ventilation, too high a temperature, and with the constant and unvarying interbreeding of a debilitated stock, the insect should have become subject to a multitude of maladies, and threaten, at no distant period, to become extinct!

By here condemning the system of interbreeding, I must, however, guard against the possibility of being misunderstood, for I am well aware that in France a very senseless outcry has been raised in some quarters against the interbreeding of brother and sister, and other near relatives, as if, in a state of natural freedom, such a proceeding was not the general and authorized rule. What I condemn, and in this I am happy to find myself supported by such weighty authority as that of M. Guérin-Ménéville, is not the intercourse of near relations, but the incessant interbreeding of diseased and debilitated individuals, which, as "like produces like," cannot possibly do otherwise than perpetuate and aggravate both disease and debility. Where brothers, sisters and cousins are all healthy and of sound constitution, no bad consequences will ensue from their interbreeding, for such is the established plan upon which nature acts; but where disease exists, the breeding from two deteriorated individuals, whether they be nearly or distantly related, will only add fuel to the fire, and perpetuate, and even aggravate, disease.

I assert, then, that there is no such thing now in existence as a perfectly healthy domesticated stock of silkworms, the colour proving, beyond all doubt, that the constitution has been utterly destroyed, and the wonder rather is, that the worms have continued to live so long, and to yield such good returns under such

a constant struggle against adverse circumstances; for it seems quite evident, since naturalists have never recorded the colours of the caterpillar to be otherwise than ashy or creamy-white, that even so long ago as the time of the Emperor Justinian, the true colour of the worm had already been obliterated by the centuries of mismanagement to which the Chinese had subjected the insect. It is true that the occasional occurrence of dark-coloured worms among the general brood has been observed, yet these occurrences are always spoken of as exceptional cases indicating variety arising from domestication, rather than as denoting, what in reality is the fact, an attempted return, on the part of nature, to the original colours and characteristics of the species.

Under no other supposition than this does it appear possible to account for the error committed by the older naturalists; and, consequently, I again assert, with the greatest confidence, and shall presently prove, that the whiteness of the worm is to be regarded solely as a positive indication of the loss of constitution, and that the species, in its natural colours, has yet to be described.

The Fruitlessness of seeking for healthy Seed.

I shall probably be told that learned and experienced men have occasionally been sent from Italy and France, in order to collect fresh seed (as it is termed) for the purpose of renovating the sickly stock of Europe by the re-infusion of a healthier and more vigorous constitution from the worms of India and of China. Such an assertion, to a certain extent, would, no doubt, be true, since it cannot be denied, that a search for healthier stock has often been made, though never with success, from the simple fact, that whether in Europe, Persia, India or China, the worms are all equally degenerated, or if indeed there be a difference yet perceptible, it is altogether in favour of the European race. We can all "call spirits from the vasty deep—but will they come when we do call?" Had a search been instituted in China for *the wild worm* in its original state of freedom, great benefit would no doubt have ensued from its discovery; but if we reflect that the worm, even in its native country, has, like that of Europe, been immemorially of a pale colour, a Chinese cultivator on being asked for the original wild stock would at once acknowledge that he knew the worm under no other aspect, and in no other condition, than that in which for so many centuries it had been cultivated by his forefathers, and the idea of its having possibly

changed or lost its colour under domestication, would in all probability never enter into the head either of the Chinaman or of his interrogator. Seeing then, as I shall presently show, that the Eastern is infinitely inferior to the European stock, the crossing with seed selected either in India or in China would only be adding to the disease which already threatens the West with such disastrous consequences.

Nature of Experiments explained.

I may, however, be asked, what proof I can adduce of disease and change of colour? As regards the existence of disease there is no occasion to reply, as the fact is only too well known; but as regards the loss of colour, I have abundant evidence now before me.

All those, indeed, who have had the least experience in the rearing of the silkworm must have perceived the occasional occurrence among the brood of one or more dark-grey or blackish-brindled worms, contrasting strongly and curiously with the pale sickly hue of the majority. These, by the French cultivators, are called "*vers tigrés*" or "*zébrés*," that is, "tiger or zebra striped,' and are regarded as a mere variety. Yet these are, in fact, the original and natural worms!

My attention having long since been arrested by this circumstance, it at length occurred to me to endeavour by a series of experiments to ascertain the cause, my conviction being, either that the species had at some time or other been crossed by another of different colours, and that nature, as sooner or later she always will do, was making an effort to separate them; or that the original colour of the worm had in reality been dark, and an effort was being made to *revert* from a sickly condition to the original healthy starting-point. Acting on this idea, I at once determined to assist Nature by giving her fair play, and, consequently, picked out all the dark-coloured worms and reared them separately, allowing the moths to couple only *inter se*, and the same course was pursued with the white worms.

In the following spring the one batch of eggs produced nearly all dark-brindled worms, while the other produced white ones, sparingly interspersed as before with an occasional dark one; these latter were removed into the dark batch, which was at the same time weeded of its pale worms.

In the third year the worms were still darker than before, and were always larger and more vigorous than the pale ones, giving likewise larger and better stuffed cocoons.

Unfortunately, just as the eggs of the third year had been deposited and collected, a violent and unexpected gale of wind suddenly upset the whole and irretrievably scattered them abroad. I had, however, seen such good reason for hoping that I might eventually by this method succeed in restoring the constitution of the worm, that I commenced *de novo*, and went over the same ground again.

The eggs with which my experiment was recommenced, were procured in the spring of 1862 from Mr. Cope of Umritsir, in the Punjab, who assured me that they had just arrived direct from Cashmere, although, from their appearance, I strongly suspect they owed "their birth, parentage and education," to the Punjab, and had been sent by mistake. But however this may be, on their arrival at Mussooree, I submitted them to the microscope, which at once proclaimed them to be ill-formed, discoloured and diseased.

This Mr. Cope denied; nevertheless it was a fact, and as the worms proceeded towards maturity, various phases of disease became apparent, and I can only account for the denial of its existence by Mr. Cope and some cultivators in Bengal, by supposing that they do not know a disease even when they see it. The worst form attacked the worms just previous to their spinning the cocoons, and gave them the appearance of having been sprinkled with ink from a pen. This is, I believe, what the French term being "peppered," or "*vers poivrés;*" a most expressive and appropriate term.

Nevertheless the cocoons were formed, though, as might be expected, they were thin, papery and greatly deficient in silk; as cocoons, indeed, they were perfect trash, but, as I had a point to ascertain in respect to the silk, I despatched them to Mr. Turnbull of Ganthal, an experienced and skilful superintendent of silk filatures, ever willing to oblige, and who had likewise reeled for Mr. Cope of Umritsir, and Colonel Clark of Oudh; the result was, that my worthless cocoons yielded a silk not one whit inferior *in quality* to that produced by the inordinately-belauded cocoons of the above-mentioned gentleman; and, indeed, although *in epistolâ* Mr. Cope pronounced Colonel Clark's cocoons to be "the finest he had seen in India," it was declared by Mr. Turnbull, who reeled them, that they had deteriorated 56 per cent. below the Cashmere standard furnished by Mr. Cope himself, and as that standard is itself about 50 per cent. below that of France and Italy, we may safely put down the best Indian cocoons of the true *Bombyx Mori* as being 75 per cent. worse than they ought to

be; and yet, in spite of common sense and twenty-five years' experience, I am modestly required to believe that the worm is not diseased! What then, in such case, is the meaning of the panic in France and Italy?

It is to be remembered, however, that all my sickly worms were of the white variety, and that the few dark worms picked out from them escaped disease altogether, although reared in the same manner, in the same room, in the same temperature, on the same quality of food, and in close contiguity to the others. These dark ones in due time spun cocoons and produced moths, which, coupling *inter se*, deposited a fair stock of eggs, with which the experiment was again carried on in the spring of 1863.

I may here observe that it is a well-known fact that the more numerous are these dark-coloured worms in any brood, the healthier is it considered to be, and *vice versâ*.

Now the eggs furnished by Mr. Cope in the spring of 1862 produced very few dark worms, while the eggs from dark worms descended from them produced in 1863 an undue number of white worms, which had to be weeded out, and proving at the same time the extreme weakness of constitution of the stock upon which I was experimenting.

Again, another proof of disease is found in the fact that in the spring of 1862, the eggs received from Urmitsir were all loose and detached: this is characteristic of the species whether in India or in Europe, and proceeds from weakness in the glands attached to the ovipositor, and which do not, in consequence, secrete the gum necessary to attach the egg. A few will of course always be found to adhere at first, but so slightly that the least touch causes them to fall.

In the spring of 1863 the eggs obtained in the previous year from the dark stock began to hatch on the 16th of March, and no sign of disease was apparent among them until the moths came forth from the cocoons, when many of these still showed defect in the malformation and dark spotting of the wings. As compared, however, with the previous year there was decided improvement; there were still too many white worms in the brood, but they did not show any symptoms of disease and none died; they attained to a larger size by a quarter of an inch, increasing from three to three and a quarter inches in length; they produced, in consequence, larger cocoons, though still deficient in silk, and the moths, although still showing the presence of disease, laid good sized eggs, great numbers of which adhered firmly to the paper upon which they were deposited, and indeed one sheet of paper

was thickly covered with them, a thing which, although I have paid attention to this subject for the last twenty-five years, I never witnessed before, nor even heard of it. The eggs of other species will adhere, but to find those of the *Bombyx Mori* doing so is truly a novelty which betokens decided progress towards a healthier condition.

There was likewise another indication of returning strength to be seen in the fact that, while ordinarily the male moths are so sluggish as to make no attempt to fly, many of those produced from my black stock left the trays and flew off to seek the females in a distant part of the room. This is one of the marked characteristics of the wild moth of *Bombyx Huttoni*, which flies off from tree to tree for long distances when "on amorous thoughts intent."

But still more extraordinary appears the fact that some of the eggs of *B. Mori* of the spring crop of 1863 began to hatch *again for a second crop* on the 7th of August of the same year; these were all from the dark stock, and the circumstance, in itself perfectly novel, arises, I am inclined to think, from an accession of strength acquired by reversion to a state approaching more nearly to the original constitution.

The hatching continued throughout August, and occasionally even to the 23rd of September, when, fearing that my supply of leaves might fail, the eggs were removed to a temperature below 70° Fahrenheit in order to check the hatching.

The worms now hatched continued to grow and thrive, and spun good cocoons superior in size to those of the spring crop, the worms attaining to $3\frac{4}{10}$ inches in length. In due time the moths appeared and were fully twice as large as those of spring, depositing large well-formed eggs. In the beginning of December, to my dismay, more worms were hatched from the spring batch, and continued to come forth throughout the month at the rate of 40 or 50 daily in a temperature of 53° Fahrenheit, when, having no more leaves upon the trees, I was compelled to place the remaining eggs out in the open air at night in order that the sharp hoar frosts might effectually put a stop to any further hatching. All these worms were of the dark kind, and no white ones now appeared among them as in the spring; indeed from the white stock only three worms were produced and these came to nothing. This circumstance, so thoroughly unusual with *Bombyx Mori*, I attribute entirely to an accession of health and strength in the black worms, which are evidently now in a transition state, which may account in some measure for their hatching out of season, so

irregularly and in such a low temperature. This, however, must close the experiment for 1863, and I must hope for some decided results in the spring of 1864 from the eggs deposited in October, 1863.

In the meantime then I will return to the consideration of what the worm ought in reality to be.

The Dark Worm is the Natural Colour.

That the dark colour is the natural one is shown in some measure by the strong similarity, evinced in the disposition and arrangement of the markings, to the wild races of India; while the moth also, instead of remaining so purely white in wings and body, assumes a dark ashy or smoky hue on the body of the males, which is likewise diffused over a great portion of the wings, as in *Bombyx Huttoni*.

Here, then, I think I have already given in the above account strong proofs that the original colour of the worm was dark, and that the pale sickly hue which it has long since assumed is entirely owing to debilitated constitution.

Nor is there here much room for wonder when we reflect how often among our other domestic stock the original colour fades away, to give place to pie-bald, and finally to white. Need I do more than call attention to our domesticated rabbits, our pigeons, domestic fowls, turkeys, Guinea fowls, ducks and geese, in proof that the more the white colour prevails the further do the species recede from their natural characteristics, and the weaker becomes the constitution. Even our cage birds, as every bird-fancier well knows, exhibit this same tendency to lose their original colours, and become paler and paler, until many eventually turn altogether white.

On this subject, for the purpose of strengthening my argument, I feel that I cannot do better than quote a passage from General Daumas' very able work on "The Horses of the Sahara," that writer's views being so thoroughly in accordance with my own.

"It is abundantly apparent," says the General, "that legendary traditions and experience are in perfect harmony in according a decided superiority to coats of deep and decided hues. Coats of a light pale colour are held in no esteem whatever. The horse's coat, therefore, must be an index to his character. The long experience of Mahomed the prophet and of Moussa the conqueror must have placed them in a position to speak with full knowledge of the subject, and their opinion, confirmed by that of all the Arabs, the best horsemen in the world and the most interested in

studying the animal, upon whom indeed depends their honour and their life, is certainly entitled to be regarded with some respect. It is beyond all question that the *Koummite*—red mingled with black, chestnut or bay—is preferred by the Arabs to all others. If I might be allowed to quote my own personal experience, I should have no hesitation in saying that, if there be any prejudice in the matter, I share it with them. Besides, must it necessarily be a prejudice because it may seem to be one? *No one will deny that all the individuals of the same species are, in their wild state, identical in colour and endowed with common instinctive qualities inherent in the race.* These colours and these qualities undergo no alteration or admixture *except in a state of servitude and under its influences, so that if any of these individuals by a return to their natural condition,* more easily proved than explained, *happen to recover the colour of their first ancestors, they will be equally distinguished by more broadly defined natural qualities.* The canine race may be taken as an illustration. Whence it follows that a certain number of domesticated individuals being given, their coats alike and with dominant qualities, it may be fairly concluded that this coat and these qualities were those of the race in its wild state. In the case then of the Arab horse, if it be true that those whose coat is red shaded with black are endowed with superior speed, are we not justified in inferring that such was the uniform colour, such the natural qualities, of the sires of the race? I submit with all humility these observations to men of science.

"Abd-el-Kader assures us, moreover, that it is ascertained by the Arabs that *horses change colour according to the soil on which they are bred.* Is it not possible, in fact, that *under an atmosphere more or less light, of water more or less fresh, of a nurture more or less rich according as the soil on which it is raised is more or less impregnated with certain elements,* the skin of the horse may be sensibly affected? Every one knows that with any coat *the colour changes in tone and shade according to the locality where the animal lives, the state of its health, the quality of the water it drinks, and of the food it eats, and the care that is bestowed upon it.* There is, perhaps, in all this a lesson in natural history not to be despised, for if the circumstances in which a horse lives *act upon his skin, they must inevitably act also in the long run upon his form and qualities.*" *

Truly does the author here remark, that there is "in all this a lesson in natural history not to be despised," though, doubtless, he

* "The Horses of the Sahara," by Gen. Daumas, p. 20. English Translation.

little thought how applicable were his observations to the actual condition of an insect of such value and importance to his own countrymen as the *Bombyx Mori*. I have *italicised* those passages to which I wish more particularly to draw the reader's attention, and shall now proceed to show their applicability to my present subject.

That the long-continued domestication of the silkworm has tended greatly to deteriorate its original constitution, the numerous diseases to which it is now subject, in every country where cultivated, furnish ample proof. That imperfect ventilation of the rearing houses produces a vitiated and impure atmosphere, highly injurious to health; that the nourishment derived from the mulberry leaves will be more or less good according to the condition of the tree from which they are gathered; and that the tree itself will be influenced by the nature of the soil and the temperature of the climate in which it grows, are facts of which every observant cultivator is well aware.

As with the horse, then, so with the silkworm; an unhealthy state of the atmosphere in which it is reared, together with an insufficiently nutritious diet, combined with other disadvantages which are incidental to a state of servility or domestication, must sooner or later exercise a very marked effect upon the general health of the animals, and the constitution, being once impaired, will necessarily, by affecting the animal functions generally, not only act upon the skin and colour, but engender debility and disease.

It is under such circumstances, and when the species threatens to become extinct, that nature's great Guide and Ruler, acting for the creature's good, and with a view to the preservation of the species, invariably makes efforts to restore it to its original characteristics, and these symptoms of *reversion*, if seized and followed up by judicious efforts on the part of man, may enable him, perchance, eventually to cast out disease, and restore the species to its natural colours and original strength of constitution.

Herein consists the entire secret of my experiments with the *Bombyx Mori*. Seeing that a very remarkable difference in colour sometimes occurred, and being fully aware of the truth of General Daumas' remark, that "the colours and the qualities undergo no alteration or admixture except in a state of servitude, and under its influences," I determined to ascertain whether the dark colour of some worms was or was not occasioned by an effort on the part of nature to *revert* to the original point at which

domestication had commenced, and that it actually is such is proved, not only by the colours remaining permanent in the black race, which *they do not in the white race*, but by the acquisition of qualities which originally belonged to the species and which the pale-coloured worms do not exhibit. Thus, as the General truly observes, "the recovery of the colour of their first ancestors has caused them to be distinguished by more broadly defined natural qualities."

Still further, we gather from the observations of M. Boitard, that "the black worm, which is so often met with in the north of France, is absolutely unknown in Italy; and yet the eggs, which in France will produce them, are often purchased in Italy."

Here it is plain, if my views are correct, that climate tells upon the constitution of the insect even in Europe, and that in Italy, where the temperature is high, the black worm is unknown, simply because the heat of the climate, combined, perhaps, with too high a temperature in the houses, enervates the worm and causes it to depart further from its original type than it does in France, where the climate is colder and more favourable to the general health of the insect.

Again, the same writer informs us, that "in Lombardy the worm which produces the white silk will constantly furnish nine white cocoons to one yellow one, although in France, no matter how much care may have been bestowed upon the worm, the yellow cocoons will always far out-number the white ones." Now I have long entertained the idea, that the production of white cocoons is (except in cases where that colour is permanent in all climates) a strong sign of degeneracy, proceeding from weakness of constitution, the rather that such white cocoons are always more abundant where the temperature is high, than in more temperate climates. Hence in Italy the worms, which in that high temperature will constantly produce an excess of white, will in a more favourable situation and circumstances produce an excess of yellow, cocoons. Thus, the *Boro-pooloo* of Bengal (*B. textor*, nob.), which there and in China, as a rule, produces white cocoons, when reared in the colder climate of Mussooree yields almost all yellow cocoons; while to find a white cocoon among the worms of Cashmere (*B. Mori*) is altogether the exception.

Hence I come to the conclusion, that the whiteness of the worm and the white cocoons are both indications of failing constitution, evidencing the existence of a higher temperature and of a more thoroughly artificial treatment than are conducive to the

health of the insect. Were the white or the yellow colour to remain permanent in all climates and temperatures, the fact might reasonably be regarded as a specific character, but where, as in the above observations, we perceive these colours to be dependent upon temperature, we are compelled to regard the change as entirely dependent upon the state of health.

Thus heat, by causing debility, undermines the constitution, and gradually changes the natural colours, of both the insect and the silk secreted by it, into a sickly white, while a restoration to a cooler climate will, under proper management, restore the colours to their natural shade, by imparting vigour to the drooping insect.

Deterioration proved.

Those who possess any real knowledge of the subject under discussion will, I am fully aware, require no further proof of the worm's deterioration than has already been furnished above; yet as there are not wanting some pretended savans, whose private interests prompt them to conceal as much as possible the maladies under which all our worms are labouring, I shall proceed yet further to show, even from their own arguments, how very little they really know upon the subject.

Common sense will at once point out that a worm imported from the northern provinces of China will not long maintain its vigour in any part of the hot lowland provinces of India, and indeed this is fully shown by one cultivator proposing to preserve the eggs of *Bombyx Mori* by sending them from the Punjab to the mountain station of Durrumsala, as well as by the fact that Jaffer Ali of Mooltan invariably preserves his in a cool underground chamber or *tykhana*.

It is evident from this, that even the heat of the Punjab is far greater than the egg can bear, and if it be inimical and destructive to the egg, it will undoubtedly be equally so to the insect in every other stage. The loss annually sustained by the cultivator Jaffer Ali, even when the eggs are kept in the *tykhana*, is said to be "from a fourth to a third," the heat (even under ground!) drying up the eggs without hatching the worms![9] If this can be called successful cultivation then no one need despair!

From this admission it is clear that what actual disease effects in France, where "*la muscardine*" is said annually to destroy more than one-fourth of the worms, is effected by heat, even in an

[9] Powlett's Report in Proceedings Agricult. Soc. of India, 9th July, 1862.

underground cellar, in the Punjab; how then, in such a climate, can really good results be expected, since the same writer, while trumpeting forth the wonders performed in the Punjab, very naively winds up his laudations with the assurance that "*out of taikhanahs the eggs cannot be preserved in the plains at all.*"

As to his assertion that those eggs "that survive the heat are not injured, but produce as healthy and fine worms as if the eggs had been kept in a cool climate," it actually amounts to nothing, unless at the same time we can feel assured that the writer is well acquainted with what the worms ought to be, and can prove that they are as large and produce the same quantity of silk as those of colder climates; and that such is not the case is proved by the testimony of Mr. C. J. Turnbull, who states that Umritsir-reared cocoons are 56 per cent. below the Cashmere standard!

Indeed this gentleman, who is undoubtedly a good authority, pronounces the cocoons of Oudh and of Umritsir to be about equal, so that they had degenerated in those localities *in one season* 56 per cent. below the standard of Cashmere as furnished by Mr. Cope himself a couple of years before!

Again, cocoons raised at Lucknow in Oudh by Dr. Bonavia required 5,200 to the pound of silk; at Candahar in 1840 the Afghans reckoned about 4,500 to the pound of silk; while in France, previous to the late epidemic, 2,500 cocoons were, on the testimony of Mr. Bashford,* equal to a pound of silk.

Here, then, we have positive evidence that the climate of the Punjab and other parts of the plains of India is injurious to the health and general well-being of the insect.

Now it is also the opinion of Mr. Turnbull that the Candahar and Cashmere yield of silk is pretty nearly on a par; and as from the above statistics the Oudh and Punjab cocoons are at least 50 to 56 per cent. below the Cashmere standard, which is itself considerably below that of France, we may safely say that the cocoons of the Indian-bred *Bombyx Mori* are little short of 75 per cent. below what they ought to be.

What benefit then, I would ask, is likely to ensue from the introduction into Italy of the eggs lately purchased in Cashmere by Dr. Carlo Orio? The worms reared from those eggs will no doubt be improved by the change of climate and more judicious treatment, but they will add nothing to the health and vigour of the European stock!

It has been justly remarked that "there are few individuals

* Journal Hort. Soc. of India, vol. ix. part 3, p. 261.

who have not watched the interesting changes which take place in the larvæ of the *Bombyx Mori*, or common silkworm, from the point of its exit from the egg until it has reached its full butterfly existence; and many there are who have been sadly disappointed at the mortality which comes over a brood of silkworms in a single night from some cause or causes unknown, and consequently irremediable. Such epidemics are continually occurring in China as well as Europe, and constitute one of the greatest obstacles to the introduction of the culture of the silkworm into England. What occasions this sudden decimation of these insects has never been determined, but has long led to a wish, on the part of those interested, that a more hardy breed of silk-producing worms could be introduced into Europe, even though the produce was coarser and of a worse colour than the ordinary mulberry silk."* Here, then, is a further and very recent testimony to the diseased state of the worm.

Good Quality of the Silk no Proof of general Health.

I shall doubtless be told that "the proof of the pudding is in the eating," and that as silk of the best quality and worth twenty-five shillings per pound has been produced in the Punjab, the worm cannot possibly be diseased or have lost its constitution.

To this I reply, that in order to test "the pudding" properly and fairly, we require a judge possessed of some knowledge of what a pudding ought to be.

In the introductory remarks to my "Monograph on the Genus *Attacus*," I have shown, after Kirby and Spence and other authorities, that the gum from the reservoirs being conveyed to the mouth by the constriction of certain muscles, passes through two small orifices in the lip, and the two fibres thus formed, being taken up and twisted together by the hook-like processes in the mouth appointed to that office, become one fibre of silk on coming into contact with the cold external air. Now these two orifices in the lip are expressly appointed to the purpose of regulating the thickness of the silken fibre with which the cocoons are formed; they are a provision of Nature which determines the thickness of the silken thread, and that thickness, in worms of equal size, will be constantly uniform, so that a large and healthy worm will yield a thicker fibre than a smaller and degenerated worm.

As long as the reservoirs contain gum, the thickness of the silk will be the same whether the worm is diseased or not, provided

* Journal Soc. Arts, Nov. 6th, 1863, p. 776.

always that the worms are of equal size; and that simply owing to the regulating organ above mentioned. The quality of the silk comprises thickness of fibre, tenacity and elasticity, and where the secreting glands are not affected by disease, this quality, from worms equally well fed, will be the same even where the general health of the one is far inferior to the other; indeed it is the quantity, rather than the quality, of the silk that is affected by the maladies under which the worms are now labouring. The cocoons reared in Oudh by Colonel Clark, and pronounced by Mr. Cope, *in epistolâ*, to be "the finest he had seen in India," produced, on being reeled, a silk of precisely the same quality as that produced at Umritsir, and by my Mussooree cocoons reared from Mr. Cope's supply of diseased eggs in 1862, and which, as cocoons, were absolutely worthless, there being little or no silk in them. Dr. Bonavia's cocoons, raised in Oudh in 1863, from seed furnished by Mr. Cope, yielded a silk in no respect inferior to the above, although the pound of silk requiring 5,200 cocoons to produce it proved how terribly deficient was the quantity of gum secreted. In cases where the glands are affected by disease, or where the leaf has not contained a proper proportion of silk-yielding matter, no silk at all will be secreted, and the worm will either die as such, or become a pupa without spinning. Many cases of this kind occur in all the broods, whether monthly or annual.

To talk, as some do, of coarse leaves producing a coarse silk, and therefore recommending the use of such as are thin and tender, is at once to prove non-acquaintance with the anatomy of the insect and ignorance of the whole art of nourishing the worm, since, as already pointed out, the thickness of the silk fibre is regulated by Nature, and a thin fibre produced by a worm, which, like *B. Mori*, ought to yield one of a certain thickness, is a positive proof of the presence of disease, inasmuch as it indicates the decreasing size of the orifices, consequent on the deterioration and degeneracy of the worm. The orifices in the lip being of a regulated size, no extra-natural coarseness of fibre can be produced, and no coarseness of leaf could ever make the fibre thicker than Nature intended it to be, or than those orifices were capable of admitting, simply because it is a well-ascertained fact that "a camel cannot pass through the eye of a needle."

Remarks on "the Diet of Worms."

Having been frequently applied to from different quarters for information as to the best kind of mulberry leaf on which to rear the silkworm, it may be as well perhaps to give the result of my

own experience, and leave each inquirer to please himself as to the species he may find it most convenient and most suitable to adopt.

The question then is, "what species of mulberry tree is best adapted for the nourishment of the silkworm, and for the production of good silk?"

Were all climates alike the question might be easily answered, but in its present form it is too vague and general; besides which, thus put, it assuredly implies a belief that we have only one species of silkworm under cultivation, and that whether monthly or annual, all come under the head of *Bombyx Mori*. This, however, is not the case, the name of *B. Mori* belonging of right to the worm known in India as the Cashmere worm, which is an annual, and is cultivated in Afghanistan, Bokhara, Persia, Syria, Italy, France and other European countries. It was originally brought from the northern provinces of China, where the country is mountainous, and the climate, especially in winter, very severe and cold. There is also another worm cultivated as an annual in Bengal under the native name of *Boro-pe'oloo*, which means "large cocoon," it being the largest species of *Bombyx* under cultivation in Bengal. As compared with the cocoon of the Cashmere worm, however, it is very much smaller, of a different form and texture, and yielding generally a pure white silk, although, as already observed, in the colder temperature of Mussooree the yellow cocoons are at least quite as numerous as the white. This likewise is from China, and from its being an annual is supposed, with good reason, to be a native of the northern parts of that country. This species I have named *Bombyx textor*, as it is totally distinct from the Cashmere worm.

Three other species domesticated in Bengal are respectively termed the Madrassee or Nistry,—the Dasee,—and the small Chinese monthly worm; these three are termed monthly worms because they yield from six to eight crops during the year. These I have respectively named *Bombyx Cresi*, *B. fortunatus* and *B. Sinensis*, while from the fact of their yielding several crops a year I am inclined to regard them as belonging to the warmer and more southern parts of China, the number of broods indicating a climate in which food is abundant throughout the year, while the annuals on the contrary, as every naturalist is aware, indicate a far more temperate climate.

Besides these there is said to be another species cultivated in Arracan which yields a silk superior to that of the Bengal worms, but as I have been hitherto unable to procure it for examination,

I can do no more than indicate its existence and name it provisionally as *Bombyx Arracanensis*.

Seeing, then, that this diversity exists among the worms, it is but reasonable to infer that in their native countries and in a state of nature, they did not all feed upon the same species of mulberry leaf, but that the annuals, like the wild *Bombyx Huttoni* of the Western Himalaya, were originally restricted to the trees indigenous to the cold mountainous regions of the north of China, while the monthly worms were in like manner confined to species adapted to the greater heats of the southern lowland provinces.

The question, then, as to which is the tree best adapted, in India or elsewhere, for the production of good silk, although apparently a very simple one, is in reality not easily answered, since much must depend upon the species of worm under cultivation, as well as upon the climate itself, and the difficulty is enhanced by the fact that every one who, possessed of much zeal but little knowledge of the subject, essays to rear silkworms, appears to think it necessary to extol some particular species of mulberry, and to pronounce it, for the time, the very *ne plus ultra* of silkworm diet.

One while it is the white-fruited mulberry only that can enable the insect to elaborate good silk, and anon, for some inexplicable whim, the white is discarded and another tree adopted in its stead. The purple-fruited species are unhesitatingly denounced, and to be "condemned without benefit of clergy."*

And yet the white mulberry is found to be nothing more than an Albino variety of the purple-fruited tree.

Count Dandolo long since pointed this out; and I have myself sown the seed of the dark purple mulberry, known to the natives as the "*Siah Toot*," and found that several of the young plants produced therefrom eventually bore white fruit only, the shape and flavour being entirely changed, and in some respects the leaf also. To my surprise, moreover, three young trees, said to be from Cashmere, and which for the past three years had borne white fruit alone, were this season (1863) covered with purple fruit.

The difference in the quality of silk reared respectively upon these two kinds—which are thus in reality not two, but one and the same—must be to a very great extent purely imaginary, and I will venture to assert that if two skeins of silk thus grown, that is to say, the one from the purple and the other from the white-fruited tree, were placed before any cultivator in India, he would not be able to distinguish between them.

* Proc. Hort. Soc. of India, 10th August, 1859, vol. xi. part 1, p. 64.

Of the *Morus alba*, Count Dandolo remarks,—"This species comprises the common wild mulberry, which has four varieties in the fruit—two have white berries, one red and the other black."

Here, then, the merest tyro may perceive that the red berry merely forms the connecting link between the black and the white fruit, and consequently that there can be but little, if any, difference in the quality of the leaf; indeed, all that the Count ventures to observe on the subject is, that "the leaf of the black mulberry, hard, harsh and tough, which is given to the silkworms in some of the warmer climates of Europe, in Spain, in Sicily, in Calabria and in some parts of Greece, &c., produces abundant silk, the thread of which is very strong, but coarse. The white mulberry-leaf of the tree planted in high lands exposed to cold dry winds and in light soil produces generally a large quantity of strong silk of the purest and finest quality."

Now, if by the term "coarse," as here applied to the silk raised from the black mulberry, is meant *thick as to fibre*, the difference is seemingly of little importance, and would be overcome, I should imagine, in the reeling by assigning fewer fibres to the thread; while that the produce of the white mulberry is not uniformly the same or to be depended upon is shown in its being only "generally," and not always, of the finest quality; and moreover "the finest quality" does not necessarily imply *thinness of fibre*, but may refer to other qualities, such as evenness, tenacity and elasticity; while, with regard to the degree of coarseness above alluded to, it must be borne in mind that it could not possibly be coarser than nature intended it to be, because the regulating orifices in the lip would prevent it. Besides which it is extremely questionable whether "high lands exposed to cold dry winds" and with a "light soil" are suitable to the mulberry tree, especially in such high latitudes; and if not, then the worms fed upon the leaves of such trees would be naturally less healthy and of smaller size than those reared under more favourable circumstances, and, consequently, the worm and the labial orifices being smaller, the silk would of necessity be finer. This, however, is not an argument in favour of the white mulberry, but against the locality in which it is grown. Seeing then that the silk cannot be coarser than nature intended it to be, while it may be much finer, the argument tends altogether to prove that great fineness of fibre is a consequence of decreasing size in the worm, produced by increasing debility of constitution.

M. Boitard, a French writer on the cultivation of silk and of the mulberry tree, informs us that the white mulberry is often tinged with red, a statement which upholds and confirms my

remark that the red holds an intermediate place between the black and the white fruit.

In 1858 the white mulberry appears in some quarters to have fallen in estimation, and the *Morus multicaulis* was likewise condemned, as it was said, "because it produces so few leaves, though they are larger, and partly because those few are too soft and milky for the worm, yielding a weak fibre."*

This statement, however, unfortunately proved to be an egregious blunder, the tree thus denounced being in reality not the *Morus multicaulis*, which, as the specific name points out, instead of having few leaves of large size, has a multitude of branches thickly covered with a moderate-sized leaf. The large-leaved tree is now named *Morus cucullata*, from the leaf taking the form of *a skull cap*, and strange to say, although pronounced to be worthless when supposed to be *M. multicaulis*, was subsequently, by the same authority, and under the equally erroneous name of *Morus Sinensis*, extensively cultivated as a first-rate silkworm diet.

Whatever may be the value of *M. multicaulis* and *M. cucullata* in their own native climates, they do not appear to have given much satisfaction elsewhere, and certainly in a cold northern climate they can scarcely be expected to do so; at Mussooree, I regard them both as trash, and although in Oudh, Dr. Bonavia found that *B. Mori* and *B. Sinensis* both ate them readily enough, yet in the later stages of the worm a leaf of greater substance was required. In such case I would recommend the coarser leaf from the very beginning, for if the young worm lacks sufficient nourishment in the two first stages of its growth, it will be next to impossible, by any amount of subsequent good feeding, to recover the ground thus lost.

It is, I am convinced, precisely because in the early stages the worms have been fed upon chopped and thin watery leaves, that the constitution has been at length brought to the very extreme of weakness. Starvation in childhood is surely not the best method of eventually producing either a strong healthy man, or any other animal!

The climate, the tree, and the species of silkworm to be reared should all, as much as possible, be adapted to each other; whereas under the present system the cultivator appears to think that climate, food and the constitution of the insect are all mere secondary considerations to be set at naught, and dis-

* Journ. Hort. Soc. of India, vol. x. part 2, p. 182.

regarded with impunity, and then wonders, because he has steadily pursued certain stereotyped rules, at the failure of his speculation.

Lest, then, this blind laudation of certain species should lead to mischievous results and disappointment among those who are desirous of entering into the speculation, I shall here beg leave to call the attention of the sericulturist to the well-known fact, that "what is one man's meat is another man's poison," and remind him that the diet which is admirably adapted to keep up animal heat and to nourish an individual in the vicinity of the North Pole, will be found both unsuitable and highly injurious to health in lower and warmer latitudes. We have but to cast a glance around us in order to perceive that each nation, according to its climate, differs somewhat from another in the matter of food; those of the warmer parts of the world being more frugal and less gross in their diet than those of the colder regions. Is it not proverbial, that where a Frenchman, content with thin wines and a few field herbs wherewith to make a salad, would thrive, an Englishman, addicted, as he is, to strong ale, with an unlimited allowance of beef and bacon, would starve outright? The raw seal blubber, so palatable to the Esquimaux, would be wholly unsuited to the more temperate countries of Europe, and, as a rule, we find that the diet is the simplest in the hottest regions, and becomes gradually more gross as we approach the north, where the cold requires the use of more solid and stimulating food to promote and keep up the animal heat of the body.

Something of the same kind is assuredly perceptible also among the feral tribes; the bears, for instance, being far more carnivorous in high latitudes than near the tropics, where fruits, vegetables and insects constitute the animal's food; but confining my remarks for the present to the larvæ of the *Bombycidæ* or silkspinners, we find that nature has ordained that the species in different latitudes shall feed upon different trees.

It may be said that this arises from the fact that the same trees are not found in these different localities, and consequently that the insects are compelled to seek another food, or to starve; this, however, does not appear to disclose the true philosophy of the question, and it certainly does not prove that such food in southern regions is equally stimulating with that of northern climes, but rather that instinct teaches the insect to accommodate itself to the provisions provided for it, precisely as a traveller to the northern regions makes use of pemmican, which he discards

on returning home. There are indeed not wanting proofs that even where the food of one latitude exists in another, the insect will refuse to eat it, as if aware that it is no longer suitable to its wants! The truth seems to be this, that where a tree and an insect have existed together in, perhaps, a southern latitude, and the tree ceases to grow in some more northern locality where the insect is still found, it is because the tree in the colder locality would no longer be able to furnish a sufficiently stimulating diet, and is, therefore, replaced by one more suitable to the wants of the insect. And this after all is simply one of those wise provisions of nature whereby her productions and the conditions under which they exist are mutually adapted to each other.

As a proof of this, we find that although the larvæ of the beautiful *Attacus Atlas* are known in Kumaon to feed freely and principally upon the leaves of the yellow-flowering barberry (*Berberis Asiatica?*), called at Mussooree *Russote*, yet with us, where the plant is equally common, I have never yet succeeded in inducing the worm to touch it, nor have I ever found either the larvæ or the cocoons upon this shrub. And yet out of forty-six cocoons now before me from Kumaon no fewer than forty-three have been spun among the leaves of *B. Asiatica!* Surely this looks like a case in point; besides which it is an unquestionable fact that among the mulberry trees which are known to be true species, and not mere varieties, the leaves of those from the north possess far greater thickness, consistency and nourishment than those from the tropics or warm lowland provinces. Take for example the leaves of *Morus multicaulis* and of *M. cucullata*, as compared with those of *M. Sinensis*, *M. nigra?*, and the wild indigenous trees of the North Western Himalaya.

At Pondicherry, according to information derived from my obliging correspondent M. Perrottet, the *Actias Selene* is entirely restricted to the *Odina Wodier* of Roxburgh, while at Mussooree it is polyphagous, feeding on *Coriaria Nipalensis*, *Carpinus bimana*, *Andromeda ovalifolia*, *Cedrela paniculata*, the common walnut, *Cerasus puddum*, or wild cherry, *Pyrus variolosa*, and several others. Again, *Attacus Cynthia*, which in China is nourished on the leaves of *Ailanthus glandulosa*, feeds in Cachar upon a tree called "*Lood*," and at Mussooree on *Coriaria Nipalensis*, *Xanthoxylon* hostile* and some others; and so on, indeed, throughout the family.

* In previous papers this word has invariably appeared as *Xanthophyllum*, which is an error.

The wild indigenous mulberry of Mussooree, with thick coarse leaves full of milky juice, is often so thickly covered with the larvæ of *Bombyx Huttoni*, that by the beginning of May there is not a single leaf upon the tree wherein the worm can spin its cocoon; yet although the thinner-leaved cultivated mulberry may abound in the immediate neighbourhood, it never by any chance experiences the same treatment; so that taking the hint from nature, I am inclined to recommend for the *Bombyx Mori*, when cultivated in the upper provinces, and more especially in the hills, such leaves as those furnished by *M. nigra?*, *M. Sinensis*, *Bédana* or seedless long white mulberry, and others of the thick rough-leaved kinds.

At the same time it is highly probable that certain species, which are wholly unadapted to a cold hill climate and the action of severe frost, may thrive well in the lowland provinces of India, where they will likewise be suitable to the worms of warm localities, such as I consider the Bengal monthly worms to be. But to extol in general terms one species above another, and endeavour, on wholly insufficient and often purely theoretical data, to persuade people that it is the best adapted for the nourishment of the silkworm,—the species of worm, moreover, not being specified,—is, in my opinion, the surest way of propagating pure sophistry and of insuring the failure of speculations in other districts, which, from the nature of their climates, require both a different diet and a different mode of treatment.

There is, moreover, yet another point to be considered, for although certain trees, such as *M. multicaulis* and *M. cucullata*, may thrive well enough in the Punjab and the Gangetic provinces, yet it is more than doubtful whether the Cashmere worm will thrive upon them; for while the trees delight in and are adapted to a warm lowland temperature, the insect, whose cultivation is becoming fashionable in the upper provinces, is from the northern mountainous tracts of China, situated between 32° and 34° of north latitude, whereas in our Himalayan regions frost and snow are the accompaniments of winter. The cultivator should remember that a northern insect requires a northern tree, and the northern tree requires a northern climate, and that he himself requires a certain amount of knowledge and the exercise of common sense.

Trees producing leaves of extreme thinness, like those of *M. multicaulis* and *M. cucullata*, are far from desirable on account of their containing but little nourishment, and necessitating a larger

and more frequent supply. A good and healthy leaf should contain the four ingredients of fibre, water, saccharine and resinous matter; the two first go directly to the nourishment and growth of the worm, while from the two latter is secreted the supply of gum which eventually furnishes the silk. Where the two former only are found, or where they are greatly in excess, as is sometimes the case, the worm will grow and attain to a goodly size, but will produce little, or perhaps no, silk. In breaking off a good healthy leaf, a drop or two of thick milky viscous juice should exude from the stalk, and in this resides the silk-producing matter; the *Morus Sinensis* and all the thick-leaved trees possess this in far greater quantity than either *M. cucullata* or *M. multicaulis*, and indeed from the latter species, when grown in a cold climate, it is almost absent, being thin and watery.

Yet after all, it has long since been laid down as an ascertained fact, that however much *the quantity* of silk may be dependent upon the presence of this juice, *the quality* is far less dependent upon the good properties of the leaf than upon the temperature in which the worms have been reared; so that where this is higher than the constitution of the insect is fitted to endure, no matter how well it may have been fed, the yield will always be inferior to that produced in a more genial temperature; and that the *Bombyx Mori* of Cashmere is greatly influenced even by the heat of the Punjab, is proved beyond all contradiction by M. Perrottet's observation, *in epistolâ*, that eggs deposited there and sent to him by Mr. Cope, of Umritsir, were inferior in size, and far more irregular in form, than those sent by me from Mussooree, where the climate is better adapted to the species. The fact is moreover fully established by the annual loss sustained by Jaffer Ali as above narrated, as well as by Mr. Cope's expressed intention of sending his Punjab-bred eggs to the hills during summer, and of importing annually fresh seed from Cashmere. The same remark is equally applicable to Oudh.

That the thinness of the leaf, both in *M. multicaulis* and *M. cucullata*, is a very serious defect may be gathered from Count Dandolo's remark, that "the less nutritive substance the leaf contains, the more leaves must the silkworm consume to complete its development. The result must, therefore, be that the silkworm which consumes a large quantity of leaves that are not nutritive, must be more fatigued and *more liable to disease* than the silkworm that eats a smaller proportion of more nutritive leaves. The same may be said of those leaves which, containing a sufficiency of nutritive matter, contain little resinous substance; in that case

the insects would thrive and grow, but probably would not produce either a thick or strong cocoon proportionate to the weight of the silkworm, as sometimes occurs in unfavourable seasons. My experiments," continues the Count, "prove in the ultimate analysis that, all things balanced, the qualities of the soil produce but a very slight difference on the quality of the leaf; that which will appear most evident is, that the principal influential cause of the fineness of the silk is the degree of temperature in which the silkworm is reared. It is neither the water nor the fibre of the leaf that nourishes the silkworm and renders the cocoon heavy, but *the resinous and saccharine substances.*"

The concluding sentence, however, is scarcely to be relied on, since the worm in its growth is undoubtedly nourished by the water and the fibre of the leaf, although it is equally true that the weight and thickness of the cocoon depend upon the presence of the other substances, while it is necessary to guard against the error of endeavouring to produce too much fineness in the silk, since I have already shown that to be an indication of too high a temperature and of the consequent degeneracy of the worm. Besides which, that the soil must in some measure act upon the quality of the leaf can scarcely be doubted when we consider that it is from the soil that the tree derives its nourishment, and the changes which occur both in the shape and substance of the leaf and in the colour of the fruit can be attributed, I imagine, to nothing else.

In regard to the treatment of the trees, it has been justly remarked that they may be very seriously injured by too close plucking; it has been forgotten, however, by those who in India have laid some stress upon the fact, that the remark applies rather to the mulberry trees of Europe and other temperate climes, than to those of tropical regions; for in the former there is too short a summer to enable the tree to produce fresh leaves without an injurious effort on the part of Nature;* whereas in tropical and neighbouring climates, where the summers are warm and long, and otherwise conducive to the growth of vegetation, the dread of injury need scarcely be entertained. Nature, indeed, herself points out that such is the truth, for in the Himalaya the indigenous mulberry trees may often be seen in the early part of May without a single leaf upon them, all having been devoured by the first or spring-brood of the larvæ of *Bombyx Huttoni;* and yet in

* Mr. F. Moore informs me that eggs of *B. Huttoni* hatched in April, when there were yet no leaves!

about three weeks afterwards, or even less, the same tree will be found to have again put on an abundant and healthy foliage ready for the second or autumnal brood of the same worm. This sometimes goes on year after year without the least apparent injury to the tree, and even the cultivated kinds are often stripped of every leaf and berry by the monkeys (*Semnopithecus schistaceus*), and yet put forth a second crop of both. What, therefore, Nature does, man may surely, in similar situations and under similar circumstances, imitate with like success.

Many things, indeed, in regard to the rearing of the silkworm, have passed into laws without the persons who adopt them having the slightest notion why they have done so, or even caring to reason on the subject;—thus we have one law forbidding more than a certain degree of denudation of the foliage, which is strictly applicable to northern climates only, and necessitates the planting of an additional number of trees. Then, again, another law enjoins that no moisture must remain upon the leaf for fear of injury to the worm; and yet in a state of nature we must feel assured that the leaves are often wet with rain and dew without doing injury to the worms that feed upon them; why then are they injured when in a state of domestication? Simply because Nature always feeds her worms with the best and freshest leaves, and in that state no injury ensues, as I indeed have often proved even with domesticated worms; but if the leaves, as is too generally the case, from being closely packed, brought from a distance in the heat, and kept for hours before they are given to the worms, have begun to fade and lose their natural freshness, the moisture on them, by imbibing the exhaling gasses, will act as an active poison on the worm and kill it.

Again, where the temperature of the rooms can be kept down to 80° of Fahrenheit, it is obstinately asserted that the constitution of the worm cannot suffer; yet such reasoners forget that in a warm climate they can only keep down the temperature by shutting up the house and excluding heat, and that in so doing they cause malaria to arise among the worms and ordure by the exclusion of every breath of that pure fresh air which is so essential to the insect's healthy existence.

Lastly, chopped leaves must likewise be compassionately given to the new-born worms, for fear the hardness of the leaf should *hurt their gums*, and give the tender brats *the tooth-ache*.* Not a

* Journ. Hort. Soc. of India, vol. x. part 2, p. 182.

breath of wind, not a change of temperature, must pass over these tender beings, for fear the destroying angel should stretch forth his hand and ruthlessly exterminate the whole. But common sense would fain inquire,—"Is the worm naturally of so tender a constitution that no change must be suffered to come nigh its dwelling? If so, how did the insect contrive to brave the storms, and outlive the daily changes of temperature, even from day to night, when exposed upon the trees in its own native and northern mountain climate? Nay why was such change from day to night ordained if it were to prove injurious to organic structures?"

I have proved, however, at Mussooree, that the worms of different species, even in their present debilitated state, are not so delicate as it has hitherto been the fashion to suppose, and have successfully reared great numbers of worms that were night and day exposed to every change of temperature, to every gale that blew, and above all to the constant moisture of the mists which were permitted to pass through the room, saturating leaves and trays, and causing the worms themselves to sparkle through the moisture deposited upon them. Yet notwithstanding this rough treatment no deaths occurred, no particular diseases showed themselves, and the cocoons produced were pronounced by competent judges to be good and the silk of the best quality.

They have likewise been successfully reared in France in the open air, and the cocoons are pronounced to be superior to those reared within the house.

And yet, after all, seeing that the constitution of the insect has been completely destroyed, what wonder if it be found unable to bear up successfully against the sudden changes of temperature of a foreign climate? Too great a degree of heat,—an improper system of feeding,—the exclusion of fresh air from the rooms, and, above all, the long-continued system of breeding in and in with debilitated stock, have at length reduced the worm to the condition of a *leper*, and have banished from its skin every trace of those colours with which Nature had originally ornamented it. Even in Europe it has been found that heat is inimical to its health, for not only in Italy is the best silk produced in the mountainous parts of Piedmont, but M. Guérin-Ménéville, in a tour made in 1858 through France and Italy, likewise declares that it is in "those elevated localities where the vine and the mulberry escaped disease, that the worm was found to enjoy the best health."

This indefatigable naturalist also notices a custom which has

long struck me as being most objectionable, and one which has most certainly contributed in no slight measure to destroy the strength and healthiness of the worm. "Nature," observes M. Guérin-Ménéville, "distinctly shows that it is her wish that the sexes should remain coupled for a certain time, and that time is generally from ten to twelve hours, and often more."

Yet, notwithstanding the truth of this remark, it has become the custom, after Count Dandolo, whose opinions are not always to be depended on, to separate the sexes at the end of five or six hours, and the unavoidable consequence is, that while half the eggs remain altogether unimpregnated and wasted, the other half will produce weakly and sickly worms. It naturally follows then, from this unnecessary interference with Nature's mysteries, that the worms produced are pre-disposed to disease, and as this goes on year after year, and has done so for centuries past, of course the worm becomes more and more degenerated and debilitated.

Surely even here a useful lesson may be learned from the proceedings of the wild species, since every one who has tied out the females of any of the larger *Bombycidæ*, such as *Antheræa* or *Attacus*, must have observed that the wild male found coupled with the female in the morning, will, if unmolested, remain so until after sunset, when a voluntary separation takes place.

Conclusion.

That matters, as regards the silkworm, are in a very critical and unsatisfactory condition, is fully acknowledged by the French cultivators, but I very much doubt if they have adopted the best means of checking the various maladies with which the insect is beset. Quacks, doubtless, will be found in numbers ever ready to extol some secret nostrum, but the remedies hitherto applied to cure particular phases of disease are calculated to exercise but a temporary effect, and do not by any means strike boldly home and remove the causes from which the maladies arise; hence in 1861, it was feared that the yield of silk throughout all France would scarcely rise to one-half the return given in previous years. Perfectly useless is it to seek in foreign lands for a healthier and more vigorous seed, since the loss of constitution is universal, and I confidently aver that nothing short of the re-discovery of the insect in its original state of nature, or of the complete restoration of the constitution of the domesticated stock by causing the worm *to revert* to its pristine colour and characteristics, will ever be able to avert the doom which now appears to be impending over the whole domestic stock of *Bombyces*.

The mode of doing this is as simple as could be wished. Nature, ever watchful over the welfare of her productions, herself points out the course to be pursued, and invites us to profit by her wise suggestions, when she gives us so broad a hint of the true state of affairs as to place before us in almost every brood of domesticated worms a few dark individuals, as if for the express purpose of attracting and fixing the naturalist's attention, and compelling him to adopt a method of perpetuating that dark race. Let the sericulturist separate these from his general stock, and set them apart for breeding from; let him annually weed them of all pale-coloured worms, and in the course of three or four years he will be enabled to cast aside his present sickly colourless stock, and rejoice in the acquisition of a worm far healthier than ever it has been since the day when it was first imported from the east by the enterprising monks to whom we are indebted for its introduction into Europe.

V. *Descriptions of some New Species of Butterflies found in Southern Africa.* By Roland Trimen.

[Read 4th July, 1864.]

Thirteen of the following sixteen species of *Rhopalocera* will be figured in the forthcoming second part of my "Catalogue of the South African Butterflies." Ten of the species have been discovered by Mr. James Henry Bowker, Inspector of the Frontier Armed Mounted Police, a gentleman who has devoted his leisure for several years past to the collection and observation of the Fauna and Flora of Kaffraria, and has specially given his attention to the Lepidoptera, an order in which the densely-wooded valley of the Um-Bashee appears to be particularly rich. The new species enumerated are thus distributed among the several Families, viz. :—

Pieridæ	1
Satyridæ	1
Lycænidæ	6
Hesperidæ	8

Family PIERIDÆ, Dup.

Genus Eronia, Hübn.

Eronia varia.

Exp. 2 in. 10 lin.—3 in. 1 lin.

♂. Fore-wing white, with contiguous (at apex confluent) hind-marginal black spots; a basal orange-red suffusion nearly fills cell; hind-wing creamy-yellow with white nervures, and suffused ill-defined hind-marginal spots. *Underside.*—Hind-wing and edges of fore-wing rich chrome-yellow: marginal spots small, ferruginous grey, some wanting; basal red of fore-wing deeper; a whitish, ferruginous-grey-clouded blotch at apex of fore-wing and two similar blotches on hind-margin of hind-wing.

♀. Smaller: markings fainter; basal red almost obsolete; hind-wing of a deeper yellow. *Underside.*—Of a deeper yellow; basal suffusion orange-yellow.

Hab.—Bashee River, Kaffraria.

Family SATYRIDÆ, Sws.

Genus Erebia, Dalm.

Erebia Sabacus.

Exp. 1 in. 3 lin.—1 in. 8 lin.

Allied to *E. Hippia*, Cram.

Greyish-brown; fulvous patch of fore-wing large, occupying cell (at end of which it is almost divided) and covering disc; apical ocellus bipupillate with bluish, faintly yellowish-ringed; patch of hind-wing small, enclosing two small white-unipupillate ocelli. *Underside.*—Hind-wing and apex of fore-wing whitish-grey, hatched with minute dark lines; hind-wing with three irregular transverse brown streaks.

Hab.—Cape Colony and Kaffraria.

Family LYCÆNIDÆ, Leach.

Genus Iolaus, Hübn.

Iolaus Sidus.

Exp. 1 in. 2 lin.—1 in. 3 lin.

Allied (nearly) to *I. Silas*, Westw.

♂. Bright pale-blue; apical region of fore-wing broadly black; hind-wing with large, glistening-whitish, black-ringed, basi-costal circular patch, and two black-spotted, bluish-scaled, crimson-red spots at anal angle. *Underside.*—White tinged with greyish; one transverse ferruginous streak in fore-wing, two in hind-wing (the inner one becoming black and bi-angulated near inner margin); costa of fore-wing and hind-margin of hind-wing edged with orange.

♀. Violaceous-whitish, blue-suffused from bases; apical black of fore-wing narrower and duller; hind-wing with a blackish costal border (widest at apex), two dusky sub-marginal streaks, and three large anal-angular orange spots.

Hab.—Kaffraria and Natal.

Iolaus Bowkeri.

Exp. 1 in. 5 lin.

♀. Pale fuscous, suffused from bases with light blue; beyond middle a transverse, macular, white band; fore-wing with a fuscous, white-bordered, disco-cellular streak; hind-wing with a sub-marginal, lunular, bluish-white streak which, on lobe of anal angle, unites with a marginal white line to form a white space (marked with a black spot). *Underside.*—White, with the

following ochreous, brown-edged, irregular, transverse striæ in each wing, viz.: a disco-cellular streak, a stria before middle, a broad one beyond middle, and a hind-marginal and sub-marginal line; the two striæ of hind-wing acutely angulated, being diverted abruptly to base.

Hab.—Bashee River, Kaffraria.

Genus Lycæna, Fab.

Lycæna Hintza.

Exp. 11 lin.—1 in. 1 lin..

Caudate. Allied to *L. Rosimon*, Fab.

♂. Shining violet-blue; a narrow hind-marginal blackish edging; the ordinary blackish spot near anal angle of hind-wing. *Underside.*—White; in each wing the following black markings, viz. a stria (broad in fore-wing) closing cell, an irregular transverse row of spots beyond middle, two sub-marginal rows of spots (the inner of sub-linear, the outer of small rounded spots), and a black edging-line; fore-wing with a sub-costal and an upward-curving basal inner-marginal stria; hind-wing with six spots at base, and the last two spots of outer row faintly dotted with bluish-silvery.

♀. White, shot with violaceous-bluish from bases; the black underside markings suffusedly repeated above. Cilia in both sexes white, in fore-wing interrupted with blackish.

Hab.—British Kaffraria and Kaffraria.

Genus Zeritis, Boisd.

Zeritis Chrysaor.

Exp. 10 lin.—1 in. 1 lin.

Allied to *Z. Zeuxo*, Linn.

Glittering golden-orange; each wing with a disco-cellular spot (small and faint in hind-wing) and an irregular row of spots beyond middle; no sub-marginal row of spots in hind-wing; hind-marginal border much narrower than in *Zeuxo*, and in hind-wing macular or nearly so. *Underside.*—Varying from pale creamy-ochreous to pale ferruginous-ochreous; inner-marginal region of fore-wing pale-orange, its spots with large steely centres; spots of hind-wing small, slightly glistening.

Hab.—Cape Colony, British Kaffraria and Kaffraria.

Zeritis Pyroëis.

Exp. 1 in.—1 in. 4 lin.

Allied to *Z. Zeuxo* and *Chrysaor*.

Orange-yellow (not metallic); spots as in *Zeuxo;* bases broadly blackish, densely blue-scaled; hind-wing of ♂ shot with a blue lustre; in fore-wing a broad, very even, hind-marginal border of black; in hind-wing only an interrupted edging. *Underside.*—Much as in *Chrysaor*, pale creamy-ferruginous; no basal clouding; a sub-marginal row of fuscous spots in fore-wing; spots of hind-wing usually very indistinct, if not obsolete.

Hab.—Cape Town.

Zeritis Phosphor.

Exp. 10 lin.

Allied to *Z. Perion*, Cram. (see Hopffer in Peters' "Reise," &c.)

Shining golden-orange; bases suffused with blackish-brown; fore-wing with a very broad, dark, apical border, commencing on costa and narrowing near anal angle; hind-wing with a transverse row of dark spots beyond middle. *Underside.*—Very much as in *Perion*, ♀; hind-wing and borders of fore-wing pale greyish-ochreous, hind-marginally tinged with reddish; cellular and neighbouring spots in fore-wing with steely centres; spots of hind-wing steely, dark-edged.

Hab.—Bashee River, Kaffraria.

Family HESPERIDÆ, Leach.

Genus Pyrgus, Hübn.

Pyrgus Asterodia.

Exp. 9—10 lin.

Nearly allied to *P. Vindex*, Cram., but paler, more glossy; the spots smaller, not so white; in fore-wing, the central of three cellular spots largest, nearer to outer than inner spot,—a trilinear spot just above central spot,—lowest spot of row beyond middle largest,—outer marginal row of spots wanting; in hind-wing transverse white stripe commences on costa, narrowing very much interiorly. *Underside.*—Hind-wing and apex of fore-wing less greyish, more inclining to fulvous.

Hab.—Cape Colony.

Pyrgus Sataspes.

Exp. 9½ lin.—1 in.

♂. Fuscous-brown; spots small, dull-whitish, rather suffused; only two cellular spots in fore-wing; median band of hind-wing

very much narrower than in *P. Vindex*; a double marginal row of ochrey dots in each wing. *Underside.*—Costa of fore-wing pale greyish-yellow, apex pale reddish-yellow; hind-wing pale-fuscous, clouded with reddish, crossed by two yellowish-white stripes (of which the outer unites at anal angle with an inner-marginal whitish stripe).

♀. Paler; spots more conspicuous. Underside of hind-wing reddish-ochreous, only fuscous-tinged next to stripes.

Hab.—Cape Colony and British Kaffraria.

Genus Cyclopides, Hübn.

Cyclopides inornatus.

Exp. 1 in.—1 in. 1 lin.

Allied to *C. Lepeletierii*, Godt.

Dull-fuscous; cilia dull-grey; from costa of fore-wing, beyond middle, a row of three indistinct pale dots. *Underside.*—Hind-wing, with costa and apex of fore-wing, reddish-brown; in each wing a disco-cellular pale dot, succeeded by a transverse row (in hind-wing strongly curved) of similar dots.

Hab.—Bashee River, Kaffraria.

Genus Pamphila, Fab.

Pamphila? niveostriga.

Exp. 1 in. 2 lin.—1 in. 3 lin.

♂. Fuscous-brown, hind-wing darker; fore-wing with a disco-cellular white spot, and a transverse row of white spots. *Underside.*—All pale reddish-ochreous, marked with paler nervures, except inner margin of fore-wing, which is fuscous, and that of hind-wing, which is snowy-white, edged interiorly with black.

Hab.—Bashee River, Kaffraria.

Pamphila Zeno.

Exp. 1 in. 5 lin.

Dark brown: in each wing a large orange-yellow disco-cellular spot, followed by an irregular transverse row of six similar spots: bases irrorated with orange-yellow. *Underside.*—Hind-wing and costa and apex of fore-wing greenish-yellow: hind-wing with a median and a submarginal, macular, fuscous band,—the latter joining the wider anal-angular portion of a blackish inner-marginal stripe.

Hab.—Bashee River, Kaffraria.

Genus Leucochitonea, Wlgr.*

Leucochitonea bicolor.

Exp. 1 in. 5 lin.

♂. Ochreous-yellow, deeper in hind-wing: fore-wing universally black-bordered, hind-wing also (except along costa); fore-wing with four large black spots, viz., one at base, 2nd cellular, 3rd below and beyond 2nd, 4th (largest) costal and towards apex. *Underside.*—Yellow deeper; margins very narrow; spots of fore-wing indistinct.

Hab.—Bashee River, Kaffraria.

Genus Caprona, Wlgr.†

Caprona Canopus.

Exp. 1 in. 4 lin.—1 in. 7 lin.

Semi-transparent creamy-white, with vitreous bands and spots: base in both wings and apical region of fore-wing ferruginous-ochreous. *Underside.*—White purer; markings indistinct; no basal colouring; in fold of inner margin of hind-wing, near anal angle, a conspicuous black spot.

Hab.—Kaffraria and Natal.

Genus Nisoniades, Hübn.

Nisoniades Kobela.

Exp. 1 in. 5 lin.—1 in. 10 lin.

Same group as *N. Sabadius*, Boisd.

Dusky blackish-brown, clouded with paler scales: in each wing a disco-cellular dark spot (in fore-wing always vitreous-centred in ♀ and sometimes in ♂), and a row of spots beyond middle (of which, in fore-wing, the three next costa are small and wholly vitreous in both sexes, and some of the others vitreous-centred in ♀); near base of fore-wing, below cell, a large spot, sometimes pale-centred in ♀. *Underside.*—Paler, more glossy: spots smaller, more distinct; inner margin of fore-wing dull-greyish; cell of hind-wing closed with a double streak, and spots bounded by, and often centred with, dull-yellowish scales. Cilia of fore-wing fuscous, of hind-wing greyish-yellow, regularly interrupted with fuscous.

Hab.—Bashee River, Kaffraria.

* Lep. Rhop. Caffr. (in K. Sv. Vetensk. Ak. Handlingar), p. 52.

† Ibid. p. 51.

VI. *Characters of undescribed Species of* Smiera (Chalcidites). By Francis Walker, F.L.S., F.Z.S.

[Read 6th June, 1864.]

Smiera, of which a few species occur in various parts of the world, is most abundant in South America, and numerous forms of it inhabit the Amazon region, which seems to be especially adapted to the multiplicity of the species of that genus. All the species described in the following communication were discovered by Mr. Bates, and are in the collection of the British Museum.

SYNOPSIS SPECIERUM.

A Femora postica dentibus magnis armata.
- a Antennæ filiformes.
  - * Antennæ apice non pallidiores.
    - † Abdomen nigrum.
      - ‡ Femora postica dentibus 4 magnis armata. *S. concitata.*
      - ‡‡ Femora postica dentibus 5 magnis armata.
        - § Tibiæ anticæ flavæ. *S. certa.*
        - §§ Tibiæ anticæ nigræ. *S. efficta.*
    - †† Abdomen flavo- aut luteo-varium.
      - ‡ Femora postica dentibus 3 magnis armata. *S. contacta.*
      - ‡‡ Femora postica dentibus 4 magnis armata.
        - § Abdomen immaculatum. *S. destinata.*
        - §§ Abdomen nigro-bimaculatum. *S. crocata.*
      - ‡‡‡ Femora postica dentibus 5 magnis armata.
        - § Antennæ subtus non ochraceæ.
          - × Abdomen nigro-fasciatum. *S. appressa.*
          - × × Abdomen maculis lateralibus piceis. *S. aperta.*
          - × × × Abdomen fasciis piceis. *S. cerina.*
        - §§ Antennæ subtus ochraceæ. *S. basilica.*
      - ‡‡‡‡ Femora postica dentibus 6 magnis armata.
        - § Caput nigrum. *S. composita.*
        - §§ Caput flavum aut luteum.
          - × Abdomen vitta nigricante. *S. admixta.*
          - × × Abdomen fasciis rufescentibus. *S. defuncta.*
      - ‡‡‡‡‡ Femora postica dentibus 7 magnis armata. *S. adaptata.*

‡‡‡‡‡‡‡ Femora postica dentibus 8 magnis armata. *S. correcta.*

‡‡‡‡‡‡‡‡ Femora postica dentibus 9 magnis armata. *S. eximaniens.*

** Antennæ apice rufescentes.

† Abdomen nigrum, basi flavum. *S. scissa.*

†† Abdomen fasciis interruptis nigris. *S. æmula.*

††† Abdomen flavum, immaculatum. *S. adsita.*

*** Antennæ apice luteæ. *S. attalica.*

AA Antennæ extrorsum crassiores.

* Abdomen fusiforme. *S. contermina.*

** Abdomen lanceolatum. *S. commoda.*

AAA Antennæ subclavatæ. *S. alienata.*

B Femora postica dentibus parvis armata.

A Antennæ filiformes.

* Antennæ apice non rufescentes.

† Abdomen flavum, immaculatum.

‡ Abdomen thorace multò brevius. *S. dimota.*

‡‡ Abdomen thorace paullò brevius. *S. disposita.*

†† Abdomen flavum, apice nigrum.

‡ Alæ venis fulvis. *S. expleta.*

‡‡ Alæ venis nigris.

§ Tibiæ posticæ luteæ. *S. descripta.*

§§ Tibiæ posticæ basi apiceque nigræ. *S. exhauriens.*

††† Abdomen fasciatum.

‡ Corpus nigrum, flavo-varium.

§ Petiolus non brevissimus.

× Abdomen luteum, nigro-bifasciatum. *S. adjuncta.*

× × Abdomen nigrum, fasciis flavis. *S. blanda.*

§§ Petiolus brevissimus. *S. vacillans.*

‡‡ Corpus flavum, nigro-varium.

§ Alæ anticæ apice nigricantes. *S. terminalis.*

§§ Alæ anticæ apice non nigricantes.

× Alæ cinereæ.

–‡– Antennæ scapo flavo.

++ Petiolus metathorace longior. *S. æqualis.*

++++ Petiolus metathorace brevior. *S. contributa.*

–‡–‡– Antennæ scapo subtus flavo. *S. celsa.*

×× Alæ limpidæ. *S. detracta.*

** Antennæ apice rufescentes.
† Corpus nigrum, flavo-varium. *S. annulifera.*
†† Corpus flavum aut luteum, nigro-varium.
‡ Abdomen luteum. *S. depicta.*
‡‡ Abdomen notatum.
§ Corpus flavum. *S. annexa.*
§§ Corpus luteum. *S. cognata.*
*** Antennæ ochraceæ. *S. demota.*
AA Antennæ extrorsum crassiores.
* Abdomen basi rufescens. *S. apparata.*
** Abdomen basi non rufescens.
† Alæ cinereæ. *S. deducta.*
†† Alæ limpidæ. *S. attacta.*

To the above species of *Smiera* I have added a single new species of the genus *Chalcis, C. curytomoides.*

1. *Smiera concitata.*

Fem.—Nigra; antennæ scapo subtus flavo; prothorax luteo-bistrigatus; parapsides et scutellum luteo-notata; pedes postici coxis flavo-vittatis, femoribus flavis apice nigris; tarsi intermedii flavi, apice picei; alæ obscurè cinereæ.

Female.—Black. Antennæ filiform; scape yellow beneath. Prothorax with a luteous transverse streak on each side. Parapsides of the mesothorax with a luteous streak on the outer side; scutellum with a small luteous dot on each side, and with a prominent rim which is slightly bidentate. Petiole nearly as long as the metathorax. Abdomen slightly lanceolate, shorter and much narrower than the thorax. Hind-coxæ beneath with a broad yellow stripe, which does not extend to the tips; hind-femora yellow, black towards the tips, armed with four large and two very small black teeth; anterior knees and middle tarsi yellow, the latter piceous towards the tips; fore-tarsi piceous. Wings dark cinereous; veins piceous; ulna a little less than half the length of the humerus; radius as long as the ulna; cubitus short.

Length of the body 5 lines; of the wings 9 lines.

2. *Smiera certa.*

Mas.—Nigra; antennæ subtus rufescentes, scapo subtus flavo; prothorax flavo-bistrigatus; mesothoracis segmenta flavo-strigata; tibiæ posticæ luteo-strigatæ; tarsi lutei; alæ obscurè cinereæ.

Male.—Black. Antennæ filiform, reddish beneath; scape with

a yellow stripe beneath. Prothorax with a small transverse yellow streak on each side. A small yellow streak on each of the parapsides and paraptera of the mesothorax; scutellum with an interrupted transverse yellow line on its fore-border, forming on its hind-border a slightly excavated rim. Metathorax vertical. Petiole a little longer than the metathorax. Abdomen nearly oval, shorter and narrower than the thorax. Hind-femora with one small and five very large teeth; hind-tibiæ with a luteous streak above towards the base; tarsi luteous; fore-tarsi piceous above towards the base. Wings dark cinereous; veins piceous; ulna about half the length of the humerus; radius a little longer than the ulna; cubitus rather short.

Length of the body 4½ lines; of the wings 9 lines.

Female?—Prothorax with a yellow line along each side and on the hind border, where it is widely interrupted. Scutellum with a yellow line along the hind-border. Metathorax oblique. Petiole a little shorter than the metathorax. Abdomen dingy luteous beneath. Hind-coxæ yellow on the inner side towards the tips; hind-femora with a yellow streak, which is largest on the inner side; hind-tibiæ luteous on the inner side towards the base; anterior knees and tarsi yellow; hind-tarsi black.

3. *Smiera efficta.*

Mas.—Nigra; oculi flavo-cincti; antennæ subtus piceæ, scapo subtus flavo; thorax scuti margine antico, parapsidum lituris duabus transversis, scutellique margine postico flavis; abdomen supra luridum; pedes anteriores flavi, ex parte picei; alæ cinereæ.

Male.—Black, stout. Head yellow about the eyes. Antennæ filiform, piceous beneath; scape yellow beneath. Scutum of the mesothorax bordered with yellow in front; a yellow transverse mark on each of the parapsides; scutellum yellow on the hind border, which is armed with two very small teeth. Petiole as long as the metathorax. Abdomen elongate-oval, lurid above, shorter and much narrower than the thorax. Hind-femora armed with seven teeth, of which five are large; anterior legs yellow; anterior femora and middle tibiæ mostly piceous above. Wings cinereous; veins black; ulna half the length of the humerus; radius as long as the ulna; cubitus moderately long.

Length of the body 4 lines; of the wings 7 lines.

4. *Smiera contacta.*

Mas.—Lutea; caput postice nigrum; antennæ nigræ, subtus rufescentes, scapo subtus luteo; prothorax fascia nigra luteo-

bipunctata ; mesothorax vittis tribus, guttis duabus vittaque scutelli postice dilatata nigris ; pectus nigro-bistrigatum ; abdomen supra nigrum ; pedes postici coxis apice nigris, femoribus nigro-triguttatis ; alæ cinereæ.

Male.—Luteous. Head black behind. Antennæ black, filiform, reddish beneath ; scape luteous beneath. Hind-border of the prothorax with a narrow black band, which is slightly arched in front, and contains two luteous points. Mesothorax with three broad black stripes, one on the scutum and one on each of the parapsides ; paraptera black towards each other ; scutellum armed with two small teeth, adorned with a black stripe, which is dilated and abbreviated hindward. Pectus with a black transverse streak on each side. Petiole a little longer than the metathorax. Abdomen elongate-oval, mostly black above, much shorter and narrower than the thorax. Hind-coxæ with black tips ; hind-femora armed with three large teeth, adorned with three black dots, of which one is above, the second below, and the third apical. Wings cinereous ; veins black ; ulna more than half the length of the humerus ; radius as long as the ulna ; cubitus short.

Length of the body 3 lines ; of the wings 5 lines.

5. *Smiera destinata.*

Fœm.—Lutea ; caput flavum, sulco antico margineque postico nigris ; antennæ nigræ, subtus rufescentes, scapo flavo ; thorax scuti margine antico lineaque, parapsidum vittis duabus, parapteris ex parte, scutellique macula nigris ; pedes postici coxis tibiisque apice nigris, femoribus nigro-bimaculatis et unistrigatis ; alæ cinereæ.

Female.—Luteous. Head yellow, black behind and on the furrow for the reception of the scape. Antennæ black, filiform, reddish beneath and towards the base ; scape yellow. Scutum of the mesothorax with a black line, which is connected with a short transverse black line on the fore-border ; a black stripe on each of the parapsides ; paraptera yellow, black towards each other ; scutellum armed with two small teeth, adorned at its tip with a black spot, which emits a line to the fore-border. Petiole a little longer than the metathorax. Abdomen oval, about twice the length of the petiole, very much shorter and narrower than the thorax. Hind-coxæ with black tips ; hind-femora armed with four very large teeth, which are mostly black, adorned on each side with two black spots (one apical, the other contiguous to the first tooth), and on the outer side above with a small black streak ; hind-tibiæ with black tips. Wings cinereous ; veins black ; ulna

hardly half the length of the humerus; radius a little longer than the ulna; cubitus very short.

Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

6. *Smiera crocata.*

Fœm.—Lutea, subtus flava; caput postice nigrum; antennæ piceæ, subtus fulvæ, scapo subtus flavo; thorax scuti margine antico lineaque, parapsidum maculis duabus elongatis, parapteris ex parte, scutellique macula tetragona nigris; abdomen maculis duabus lateralibus nigris; pedes postici coxis apice nigris, femoribus nigro-bimaculatis; alæ cinereæ.

Female.—Luteous, yellow beneath. Head black behind. Antennæ piceous, filiform, tawny beneath; scape yellow beneath. Scutum of the mesothorax with a black line, which is connected with a short transverse line on the fore-border, and is abbreviated hindward; an elliptical black spot on each of the parapsides; paraptera black towards each other; scutellum armed with two rather large teeth, adorned with a tetragonal black spot, which is attenuated towards the scutum. Petiole much longer than the metathorax. Abdomen elongate-oval, hardly twice the length of the petiole, with a black spot on each side near the tip. Hind-coxæ with black tips; hind-femora armed with four very large teeth, which are mostly black, adorned beneath with two black spots, one before the middle, the other apical. Wings cinereous; veins black; ulna hardly half the length of the humerus; radius as long as the ulna; cubitus very short.

Length of the body 3 lines; of the wings 5 lines.

7. *Smiera appressa.*

Fœm.—Flava; caput sulco margineque postico nigris; antennæ nigræ, scapo flavo apice nigro; prothorax strigis duabus transversis nigris; mesothoracis segmenta nigra, flavo latè marginata; metathorax anticè nigro-marginatus; abdomen nigro-quadrifasciatum; pedes postici femoribus tibiisque basi apiceque nigris; femora intermedia picco-strigata; alæ cinereæ.

Female.—Yellow. Head black behind and on the furrow for the scape. Antennæ black, filiform; scape yellow, black towards the tip above. Prothorax with a minute transverse black streak on each side. Scutum and parapsides of the mesothorax black, broadly bordered with yellow; paraptera black towards the scutum and along the hind-border; scutellum armed with two very short teeth, adorned with a nearly hexagonal black spot.

Metathorax with a black line along its fore-border. Disk of the pectus black. Petiole stout, much shorter than the metathorax. Abdomen lanceolate, slightly compressed towards its tip, much longer and narrower than the thorax; middle part adorned with four slender black bands. Hind-femora black at the tips and towards the base, whence the black hue extends along half the length of the upper border and along the whole of the lower border, which is armed with five large black teeth; middle femora with a short piceous streak on the outer side; hind-tibiæ black towards the base and towards the tips. Wings cinereous; veins black; ulna about half the length of the humerus; radius as long as the ulna; cubitus very short; spurious veins very distinct.

Length of the body 5 lines; of the wings 9 lines.

8. *Smiera aperta.*

Fœm.—Flava; caput nigro-bipunctatum; antennæ piceæ, subtus rufescentes, scapo subtus flavo; thorax scuti punctis duobus lineaque transversa postica et parapsidum guttis duabus elongatis nigris; abdomen maculis octo lateralibus piceis; pedes postici coxis tibiisque apice nigris, femoribus nigro-uniguttatis; alæ cinereæ.

Female.—Yellow. Head with two black points behind. Antennæ piceous, filiform, reddish beneath; scape yellow beneath. Scutum of the mesothorax with a black point on each side of the fore-border, and with a short transverse black line on the hind-border; an elongated black dot on each of the parapsides; scutellum with two stout teeth. Petiole as long as the metathorax. Abdomen fusiform, with four piceous spots on each side, much shorter and narrower than the thorax. Hind-coxæ with black tips; hind-femora with a black dot on the outer side at the base, armed beneath with seven black teeth, of which five are very large; hind-tibiæ black on the outer side at the tips. Wings cinereous; veins black; ulna fully half the length of the humerus; radius nearly as long as the ulna; cubitus short.

Length of the body $4\frac{1}{2}$ lines; of the wings 8 lines.

9. *Smiera cerina.*

Mas.—Flava; antennæ nigræ subtus rufescentes, scapo subtus flavo; thorax scuti punctis duobus, parapsidum strigis duabus, scutellique striga nigris; abdominis segmenta piceo-fasciata; pedes postici coxis tibiisque apice nigris; alæ cinereæ.

Male.—Yellow. Antennæ black, filiform, reddish beneath; scape yellow beneath. Scutum of the mesothorax with a black

point on each side of the fore-border; a short black streak on each of the parapsides; scutellum with a short black streak, armed with two minute teeth. Petiole fully as long as the metathorax. Abdomen fusiform, with a piceous band on the fore-border of each segment, rather shorter and much narrower than the thorax. Hind-coxæ and hind-tibiæ with black tips; hind-femora armed with six teeth, five of which are large. Wings cinereous; veins black; ulna about half the length of the humerus; radius as long as the ulna; cubitus short.

Length of the body 4 lines; of the wings 8 lines.

10. *Smiera basilica.*

Fœm.—Flava; caput nigrum, oculis flavo-cinctis; antennæ nigræ, subtus ochraceæ, scapo pallidè flavo; scuti discus, parapsides apud marginem interiorem, paraptera ex parte, scutelli vitta posticè dilatata pectusque nigra; abdomen nigro-sex-fasciatum; femora postica nigro-vittata; tibiæ posticæ rufescentes, apice flavæ; alæ anticæ cinereæ, apud costam subluridæ.

Female.—Yellow. Head black, except about the eyes and towards the mouth. Antennæ black, filiform, rather long and slender, ochraceous beneath; scape pale yellow, ochraceous above towards the tip; second joint ochraceous. Scutum of the mesothorax black, except along each side; parapsides black along the inner side; paraptera partly black; scutellum with a black stripe, which is dilated on the hind-border. Pectus black. Petiole as long as the metathorax. Abdomen lanceolate, a little longer and much narrower than the thorax, adorned with six black bands. Hind-femora black, except above and towards the tips, armed with five large teeth; hind-tibiæ reddish, yellow towards the tips. Wings cinereous, with a lurid tinge towards the costa; veins ochraceous; ulna less than half the length of the humerus; radius as long as the ulna; cubitus moderately long.

Length of the body 5 lines; of the wings 8 lines.

11. *Smiera composita.*

Fœm.—Nigra; oculi flavo-cincti; antennæ scapo subtus flavo; prothorax flavus, strigis duabus transversis nigris; mesothoracis segmenta flavo-marginata; metathorax et petiolus nigri; abdomen basi fasciisque tribus flavis; pedes flavo-varii; alæ cinereæ.

Female.—Black. Head yellow about the eyes. Antennæ filiform; scape yellow beneath. Prothorax yellow above, with a

black transverse streak on each side. Scutum and parapsides of the mesothorax yellow along the outer side; paraptera yellow towards the wings; scutellum yellow, with a black disk, armed with two very minute teeth. Metathorax and petiole yellow, the latter as long as the former. Abdomen lanceolate, much narrower and a little longer than the thorax, yellow at the base and with a yellow band near the tip; first and second segments with yellow hind-borders. Hind-coxæ irregularly yellow above towards the base; hind-femora irregularly yellow above towards the tips, armed with six very large teeth; anterior femora yellow towards their tips, this hue predominating most in the fore-femora; hind-tibiæ with a yellow streak above towards the base; tarsi and anterior tibiæ yellow, the former with black tips. Wings cinereous; veins black; ulna a little more than half the length of the humerus; radius a little longer than the ulna; cubitus very short.

Length of the body 4 lines; of the wings 7 lines.

12. *Smiera admixta.*

Mas.—Lutea; caput postice nigrum; antennæ nigræ, scapo subtus luteo; prothorax nigro-biguttatus; mesothoracis segmenta nigra, luteo-marginata; abdomen nigricante vittatum; pedes postici coxis apice nigris, femoribus nigro-bimaculatis, tibiis piceo-vittatis; alæ cinereæ, apud costam subluridæ.

Male.—Luteous. Head black behind. Antennæ black, filiform; scape luteous beneath. Prothorax with a black dot on each side. Scutum and parapsides of the mesothorax black, with the exception of the borders; paraptera black towards the scutum; scutellum armed with two very short teeth, adorned with a nearly triangular black spot. Petiole as long as the metathorax. Abdomen fusiform, with a short irregular blackish stripe, shorter and much narrower than the thorax. Hind-coxæ black above towards their tips; hind-femora black beneath at their base and at their tips, armed beneath with six large black teeth; hind-tibiæ with a piceous stripe, which is widely interrupted towards the base. Wings cinereous, with a lurid tinge towards the costa; veins black; ulna fully half the length of the humerus; radius as long as the ulna; cubitus very short.

Length of the body 4½ lines; of the wings 8 lines.

13. *Smiera defuncta.*

Fœm.—Flava; antennæ nigræ, subtus rufæ, scapo flavo; prothorax linea transversa rufescente-nigro-notata; mesothorax

vittis tribus, parapteris apud angulos interiores, scutellique vitta trigona nigris; petiolus vitta nigra furcata; abdominis segmenta rufescente fasciata; tibiæ posticæ nigro-lineatæ; alæ cinereæ.

Female.—Yellow. Antennæ black, filiform, red beneath; scape yellow. Prothorax with a reddish-black-marked transverse line. Mesothorax with a black stripe on the scutum, and one on each of the parapsides; paraptera black towards the scutum; scutellum with a black triangular stripe resting on the hind border. Petiole linear, slender, much longer than the metathorax, with a black stripe, which is forked hindward. Abdomen fusiform, with a broad reddish band on each segment, narrower and a little longer than the thorax. Hind-femora armed with six large black-tipped teeth; hind-tibiæ with a black line on the outer side beneath. Wings cinereous; veins tawny; ulna hardly half the length of the humerus; radius as long as the ulna; cubitus very short.

Length of the body 5 lines; of the wings 9 lines.

14. *Smiera adaptata.*

Fœm.—Læte flava; caput posticè nigrum; antennæ piceæ, subtus rufescentes, scapo subtus flavo; mesothorax scuti linea furcata, parapsidum guttis duabus, parapteris ex parte, scutellique vitta lanceolata nigris; pectus strigis quatuor lateralibus nigris; abdomen strigis utrinque quatuor transversis nigris; pedes postici coxis apice nigris, femoribus maculis duabus nigris strigaque picea; alæ cinereæ.

Female.—Bright yellow. Head black behind. Antennæ piceous, filiform, rather short and stout, reddish beneath; scape yellow beneath. Scutum of the mesothorax with a black longitudinal line, which is forked in front; parapsides with an elongated black dot; paraptera and epimera partly black; scutellum armed with two very minute teeth, adorned with a lanceolate black stripe, which is attenuated in front. Pectus with two black transverse streaks on each side. Petiole not longer than the metathorax. Abdomen fusiform, much shorter and very much narrower than the thorax, with four transverse black streaks on each side. Hind-coxæ black towards the tips; hind-femora armed with seven large black-tipped teeth, adorned near the lower edge with two black spots, and on the outer side above with a fusiform piceous streak. Wings cinereous; veins black;

ulna less than half the length of the humerus; radius as long as the ulna; cubitus very short.

Length of the body 3½ lines; of the wings 6 lines.

15. *Smiera correcta.*

Fœm.—Flava; antennæ nigræ, scapo subtus flavo; linea abbreviata maculæque duæ transversæ scuti, maculæ quatuor laterales posteriores trigonæ, maculaque scutelli quadrata nigræ; abdomen apice nigrum; coxæ posticæ apice tibiæque posticæ basi nigræ; femora postica nigro-bimaculata; alæ cinereæ.

Female.—Yellow, rather slender. Antennæ black, filiform; scape yellow beneath. Scutum of the mesothorax with a black line, which is abbreviated towards the fore-border, where there is a transverse black dot; a black triangular spot on each of the parapsides, and another on each of the paraptera; scutellum with a black tetragonal spot near the hind-border, which is armed with two minute teeth. Petiole not longer than the metathorax. Abdomen lanceolate, narrower but hardly longer than the thorax; tip black. Hind-coxæ with black tips; hind-femora with two black spots by the lower side, armed with eight rather large black teeth; hind-tibiæ black at the base. Wings cinereous; veins piceous; ulna about half the length of the humerus; radius a little shorter than the ulna; cubitus short.

Length of the body 4 lines; of the wings 7 lines.

16. *Smiera exinaniens.*

Fœm.—Nigra; oculi flavo-cincti; antennæ scapo subtus flavo; prothorax flavo-fasciatus; mesothoracis segmenta flavo-marginata; metathorax flavus, nigro-fasciatus; petiolus flavus, nigro-bivittatus; abdomen basi fasciisque quatuor flavis; pedes flavo-varii; alæ cinereæ.

Female.—Black. Head yellow about the eyes. Antennæ filiform; scape yellow beneath. Prothorax with a yellow band. Scutum and parapsides of the mesothorax yellow along the outer side; paraptera yellow towards the wings; scutellum yellow, with a black disk and with two minute teeth. Metathorax yellow, with a black band on the fore-border. Petiole yellow, with a black stripe on each side, much shorter than the metathorax. Abdomen lanceolate, much narrower but not longer than the thorax; yellow towards the base, and with four yellow bands, of which the three first are interrupted and the fourth is abbreviated.

Hind-coxæ irregularly yellow towards the base; hind-femora irregularly yellow towards the base and towards the tips, armed with about twelve teeth, of which nine are large; anterior femora yellow towards their tips; hind-tibiæ yellow above towards their tips; tarsi and anterior tibiæ yellow, the former with black tips. Wings cinereous, veins black; ulna about half the length of the humerus; radius as long as the ulna; cubitus short; spurious veins very distinct.

Length of the body $4\frac{1}{4}$ lines; of the wings 8 lines.

17. *Smiera scissa.*

Mas.—Nigra; caput anticè flavum; antennæ apice rufescentes, scapo subtus flavo; prothorax fascia flava nigro-bistrigata; mesothorax segmentis flavo-marginatis, scutello fascia flava nigro-uniguttata; metathorax posticè luteus; petiolus flavus; abdomen basi flavum; pedes flavi, coxis femoribusque posticis nigris basi flavis, femoribus posticis fascia arcuata flava, tibiis posticis basi nigris; alæ cinereæ.

Male.—Black. Head yellow about the eyes and in front. Antennæ filiform, reddish at the tips; scape yellow beneath. Hind-border of the prothorax with a yellow band, which on each side is much dilated, and contains a black streak. Scutum and parapsides of the mesothorax bordered with yellow on the outer side; scutellum with a deeply angular yellow band, which contains a small black dot on the hind-border, the latter armed with two short teeth. Metathorax luteous towards the petiole. Petiole yellow, longer than the metathorax. Abdomen elongate, oval, yellow towards the base, very much shorter and narrower than the thorax. Hind-coxæ and hind-femora yellow towards the base; hind-femora with a yellow arched subapical band, armed with two small and five very large teeth; hind-tibiæ yellow for fully half the length from the tips; anterior legs and hind-tarsi yellow. Wings cinereous; veins black; ulna less than half the length of the humerus; radius as long as the ulna; cubitus moderately long, clouded with brown.

Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

18. *Smiera æmula.*

Fœm.—Lutea; caput posticè nigrum; antennæ nigræ, apice rufescentes, scapo subtus flavo; mesothorax niger, segmentis luteo-marginatis; metathorax anticè fascia angusta nigra;

abdomen fasciis quatuor interruptis nigris; coxæ posticæ nigro-vittatæ; alæ anticæ cinereæ, apud costam subluridæ.

Female.—Luteous. Head black behind. Antennæ black, slender, filiform, reddish at the tips; scape yellow beneath. Mesothorax black; scutum, parapsides, paraptera and scutellum bordered with luteous; scutellum armed with two minute teeth. Metathorax with a narrow black band at the base. Petiole as long as the metathorax. Abdomen lanceolate, narrower but not longer than the thorax, with four interrupted black bands. Hind-coxæ with a black stripe, which is dilated towards the tip; hind-femora armed beneath with six large black teeth. Wings cinereous, with a lurid tinge towards the costa; veins brown; ulna more than half the length of the humerus; radius shorter than the ulna; cubitus short.

Length of the body 5 lines; of the wings 9 lines.

19. *Smiera adsita.*

Fœm.—Flava; caput posticè nigrum; antennæ nigræ, apice rufescentes, scapo subtus flavo; mesothoracis segmenta nigra, flavo latè marginata; metathorax lineola transversa nigra; pedes postici coxis femoribusque apice nigris; alæ cinereæ.

Female.—Yellow. Head black behind. Antennæ black, slender, filiform, reddish at the tips; scape yellow beneath. Scutum and parapsides of the mesothorax black, broadly bordered with yellow; paraptera black, except towards the wings; scutellum armed with two very short teeth, adorned with a nearly triangular black spot. Metathorax with a short black transverse line on the fore-border. Petiole as long as the metathorax. Abdomen lanceolate, narrower but not shorter than the thorax. Hind-coxæ and hind-femora with black tips; hind-femora with seven teeth, which are mostly black, and of moderate size, with the exception of the second, which is small. Wings cinereous; veins tawny; ulna half the length of the humerus; radius a little longer than the ulna; cubitus short.

Length of the body 4 lines; of the wings 7 lines.

20. *Smiera attalica.*

Mas.—Lutea; caput flavum, vittis tribus anticis nigris; antennæ piceæ, subtus apiceque luteæ, scapo flavo; prothorax flavus; scuti discus flavus; parapsides nigro strigatæ; paraptera

nigro-guttata; scutellum linea nigra postice dilatata; abdomen piceo-quadrifasciatum; coxæ tibiæque posticæ apice nigræ; femora postica nigro-varia; alæ anticæ cinereæ, apud costam subluridæ.

Male.—Luteous. Head yellow, with three black stripes in front, one on the furrow for the reception of the scape, and one on each side. Antennæ piceous, filiform, luteous beneath and at the tips; scape yellow. Prothorax yellow. Scutum of the mesothorax yellow, except on each side; parapsides with a broad black streak, which is abbreviated hindward; a black dot on each of the paraptera; scutellum armed with two minute teeth, adorned with a black line, which is dilated hindward. Petiole as long as the metathorax. Abdomen elongate, elliptical, shorter and very much narrower than the thorax, adorned with four or five piceous bands. Hind-coxæ with black tips; hind-femora black towards the base, adorned on the outer side with two abbreviated black lines which proceed from the black part, armed with eight large teeth; hind-tibiæ black towards the tips. Wings cinereous, with a lurid tinge towards the costa; veins ochraceous; ulna less than half the length of the humerus; radius as long as the ulna; cubitus moderately long.

Length of the body 4 lines; of the wings 7½ lines.

This may be the male of *S. basilica* (*ante*, p. 188).

21. *Smiera contermina*.

Fœm.—Flava; caput sulco antico margineque postico nigris; antennæ nigræ, scapo subtus flavo; mesothoracis segmenta nigra, flavo-marginata; metathorax nigro-bipunctatus; abdomen nigrum, basi flavum; pedes postici coxis supra nigris, femoribus nigro-vittatis; alæ cinereæ.

Female.—Yellow. Head black behind and on the furrow for the reception of the scape. Antennæ black, very slightly increasing in thickness to the tips; scape yellow beneath; scutum and parapsides black, with the exception of their borders; paraptera black towards the scutum and along the hind-border; scutellum armed with two short teeth, adorned with a large triangular black spot. Metathorax with a black point on each side. Petiole as long as the metathorax. Abdomen black, fusiform, yellow towards the base, shorter and much narrower than the thorax. Hind-coxæ black above, except towards the base; hind-femora with a black stripe along the five very large black teeth. Wings cine-

reous; veins black; ulna about half the length of the humerus; radius a little longer than the ulna; cubitus short.

Length of the body 4½ lines; of the wings 8 lines.

This species much resembles *S. commoda*, but may be distinguished by the different shape of the abdomen and by the markings on the hind-femora.

22. *Smicra commoda*.

Fœm.—Flava; caput posticè nigrum; antennæ nigræ, scapo flavo; mesothoracis segmenta nigra, flavo-marginata; abdomen nigrum, basi flavum; pedes postici coxis femoribusque apice nigris; alæ cinereæ.

Female.—Yellow. Head with a black band behind. Antennæ black, slightly increasing in thickness to the tips; scape yellow. Scutum and parapsides of the mesothorax black, bordered with yellow; paraptera black on the inner side; scutellum with a large black spot, armed with two short teeth. Petiole a little longer than the metathorax. Abdomen black, lanceolate, yellow towards the base, shorter and much narrower than the thorax. Hind-coxæ and hind-femora with black tips, the latter armed with five large teeth which are mostly black. Wings cinereous; veins blackish; ulna about half the length of the humerus; radius a little shorter than the ulna; cubitus short.

Length of the body 3 lines; of the wings 6 lines.

23. *Smicra alienata*.

Fœm.—Nigra; caput anticè flavum, oculis flavo-cinctis; antennæ apice truncatæ, scapo flavo; thorax prothoracis margine postico, parapsidum strigis duabus, parapteris ex parte, scutellique margine flavis; petiolus flavus; abdomen supra flavum, nigro-quadrifasciatum; pedes flavo-vittati; alæ obscurè cinereæ.

Female.—Black. Head yellow about the eyes and in front. Antennæ subclavate, obliquely truncate at the tips; scape yellow. Hind-border of the prothorax yellow. An oblique yellow streak on each of the parapsides, and a yellow triangular dot on each of the paraptera; scutellum bordered with yellow except on each side in front, armed with two small yellow teeth. Metathorax rugose. Petiole yellow, nearly as long as the metathorax. Abdomen lanceolate, a little shorter and much narrower than the thorax, yellow above, with the exception of four black bands, of which the first is widely interrupted. Hind-coxæ with two yellow

stripes, one above much longer and broader than the other, which is on the outer side; hind-femora with a widely-interrupted longitudinal yellow line on the outer side, and with an oblique yellow band on the inner side, armed with six large teeth; anterior tibiæ striped with yellow; anterior tarsi yellow, with black tips. Wings dark cinereous; veins black; ulna less than half the length of the humerus; radius longer than the ulna; cubitus moderately long; spurious veins very distinct.

Length of the body 5 lines; of the wings 9 lines.

24. Smiera dimota.

Mas.—Flava; antennæ nigræ, subtus fulvæ, scapo subtus flavo; mesothorax scuti margine antico lineaque, parapsidum strigis duabus, parapteris ex parte, scutellique gutta nigris; pedes postici coxis nigro-unimaculatis, femoribus apice nigris; alæ cinereæ.

Male.—Yellow. Antennæ black, filiform, pale tawny beneath; scape yellow beneath. Scutum of the mesothorax with a black longitudinal line, which joins a transverse black line on the fore-border; a broad black streak on each of the parapsides; paraptera black on the angle towards the scutum; a small black dot near the tip of the scutellum, which is armed with two very short teeth. Petiole as long as the metathorax. Abdomen slightly lanceolate, much shorter and narrower than the thorax. Hind-coxæ with a large black spot on the outer side; hind-femora with black tips, armed with one large and with about twelve very minute teeth, which are mostly black. Wings cinereous; veins black; ulna about half the length of the humerus; radius fully as long as the ulna; cubitus very short.

Length of the body 3 lines; of the wings 5 lines.

25. Smiera disposita.

Mas.—Lutea; antennæ piceæ, subtus rufescentes, scapo subtus luteo; mesothorax scuti linea, parapsidum punctis duobus, parapterisque ex parte nigris; coxæ posticæ piceo-strigatæ; alæ cinereæ.

Male.—Luteous, yellow beneath. Antennæ piceous, filiform, reddish beneath; scape luteous beneath. Scutum of the mesothorax with a black longitudinal line, which is continued on the fore part of the scutellum; a black point on each of the parapsides; paraptera black along the hind-border; scutellum armed with two extremely minute teeth. Pectus with a transverse black

streak on each side. Petiole as long as the metathorax. Abdomen slightly lanceolate, a little shorter and much narrower than the thorax. Hind-coxæ with a short piceous streak on the outer side; hind-femora armed with sixteen or more extremely minute black teeth. Wings cinereous; veins black; ulna a little less than half the length of the humerus; radius a little longer than the ulna; cubitus very short.

Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

26. *Smiera expleta.*

Fœm.—Flava; antennæ nigræ, scapo flavo; scutellum piceo-lineatum; abdomen apice nigrum; alæ subcinereæ, venis fulvis.

Female.—Yellow. Antennæ black, long, slender, filiform; scape yellow. Scutellum of the mesothorax with a piceous longitudinal line which does not extend to the tip, the latter armed with two very short teeth. Petiole stout, much shorter than the metathorax. Abdomen lanceolate, black at the tip, narrower and a little longer than the thorax. Hind-femora armed with one large and about twelve very minute teeth, which are mostly black. Wings slightly cinereous; veins tawny; ulna fully half the length of the humerus; radius as long as the ulna; cubitus very short; stigma black.

Length of the body $4\frac{1}{2}$ lines; of the wings 7 lines.

27. *Smiera descripta.*

Fœm.—Lutea; caput flavum, linea postica transversa nigra; antennæ nigræ, scapo subtus luteo; mesothorax vittis duabus, strigis duabus exterioribus, linea transversa, guttaque postica nigris; abdomen apice nigrum; pedes postici coxis supra femoribusque apice nigris; alæ cinereæ.

Female.—Luteous. Head yellow, with a black transverse line behind. Antennæ black, filiform, rather slender; scape luteous beneath. Scutum of the mesothorax with two black stripes, which are abbreviated hindward; a black streak on each of the parapsides; a black line on the hind-border of the scutum, extending to the parapteræ; a black dot near the hind-border of the scutellum, which is armed with two very small teeth. Petiole shorter than the metathorax. Abdomen lanceolate, much longer and narrower than the thorax; tip black. Hind-coxæ black above at the tips; hind-femora with black tips, armed with many very minute teeth. Wings cinereous; veins black; ulna a little

more than half the length of the humerus; radius as long as the ulna; cubitus short.

Length of the body 4½ lines; of the wings 7 lines.

28. *Smiera exhauriens.*

Fœm.—Flava; caput posticè nigrum; antennæ nigræ, scapo subtus flavo; mesothorax scuti vittis duabus, parapsidum strigis duabus, parapteris ex parte, scutellique gutta nigris; abdomen apice nigrum; pedes postici coxis femoribusque apice nigris, tibiis basi apiceque nigris; alæ subcinereæ.

Female.—Yellow. Head behind with a short transverse black line. Antennæ black, filiform; scape yellow beneath. Scutum of the mesothorax with two black stripes which converge hindward; an elliptical black streak on each of the parapsides; paraptera black by the scutum; scutellum with a black dot near its tip, which is very slightly bidentate. Petiole stout, much shorter than the metathorax. Abdomen lanceolate, black at the tip, longer and much narrower than the thorax. Hind-coxæ and hind-femora with a black apical spot on the upper side; hind-femora armed with one large tooth near the base, and with about sixteen very minute black teeth; hind-tibiæ black at the base and at the tips. Wings slightly cinereous; veins black; ulna much less than half the length of the humerus; radius longer than the ulna; cubitus very short.

Length of the body 4½ lines; of the wings 7 lines.

29. *Smiera adjuncta.*

Mas.—Nigra; caput flavum, sulco antico margineque postico nigris; prothorax flavus, nigro-bistrigatus; mesothoracis segmenta flavo-marginata; abdomen luteum, nigro-bifasciatum; pedes flavi, nigro-varii; alæ cinereæ.

Male.—Black. Head yellow, black behind and on the furrow for the scape. Antennæ filiform. Prothorax yellow, with a little transverse black streak on each side. Scutum and parapsides of the mesothorax yellow along the outer side; paraptera yellow towards the wings; scutellum yellow, with a black disk and with two very short teeth. Metathorax yellow, black along the fore-border. Petiole yellow, shorter than the metathorax. Abdomen luteous, much shorter and narrower than the thorax, with two black bands which are connected in the middle and on each side and occupy the 2nd and 3rd segments. Legs yellow; hind-coxæ with black tips; hind-femora with three black spots on each side

(the 1st and 2nd spots connected at the base, the 3rd apical), and with about sixteen very minute black teeth; hind-tibiæ black, with a broad yellow band near the base; middle femora and fore-tibiæ with a piceous streak. Wings cinereous; veins black; ulna fully half the length of the humerus; radius as long as the ulna; cubitus short.

Length of the body 4 lines; of the wings 7 lines.

This species has a close resemblance to *S. blanda*.

30. *Smiera blanda.*

Nigra; caput anticè flavum, oculis flavo-cinctis; antennæ scapo subtus flavo; prothorax flavus, nigro-bistrigatus; mesothoracis segmenta flavo-marginata; metathorax flavus, nigro-bifasciatus; petiolus flavus; abdomen basi fasciisque flavis; pedes flavi, nigro-varii; alæ cinereæ.

Male—Female.—Black. Head yellow about the eyes and in front. Antennæ filiform; scape yellow beneath. Prothorax yellow, with a transverse black streak on each side. Scutum and parapsides of the mesothorax yellow along the outer side, the former with a small yellow dot in the middle; paraptera with a yellow spot towards the wings; scutellum yellow with a black disk and with two minute teeth. Metathorax yellow, black along the fore-border and in the middle. Petiole yellow, as long as the metathorax. Abdomen elongate-oval, much shorter and narrower than the thorax, yellow towards the base, and with a yellow band on the hind-border of each segment. Legs yellow; hind-coxæ with black tips, and with an elongate black spot on the outer side; hind-femora with a black spot on the outer side above and with two black spots on each side by the lower edge, which is armed with one large and with about nine minute black teeth; hind-tibiæ black towards the base. Wings cinereous; veins black; ulna less than half the length of the humerus; radius longer than the ulna; cubitus short.

Length of the body 4 lines; of the wings 7 lines.

31. *Smiera vacillans.*

Fœm.—Nigra; caput anticè flavum; antennæ robustæ, scapo subtus flavo; prothorax et mesothoracis segmenta flavo-marginata; petiolus flavus, brevissimus; abdomen dimidio antico flavo; pedes femoribus posticis flavo-trimaculatis, tibiis tarsisque anterioribus tarsisque posticis flavis; alæ cinereæ.

Female.—Black. Head yellow about the eyes and in front.

Antennæ stout, filiform; scape yellow beneath. Hind-border of the prothorax with a yellow band, which is dilated on each side. Scutum and parapsides of the mesothorax bordered with yellow on the outer side; scutellum with a deeply angular yellow band on its hind-border, which is armed with two short teeth. Petiole yellow, very short. Abdomen slightly lanceolate, yellow for nearly half the length from the base, much narrower but not longer than the thorax. Hind-femora with a large yellow spot above on both sides, and with two small yellow spots on the outer side by the lower border, which is armed with several very minute teeth; anterior knees, tibiæ and tarsi, and hind-tarsi yellow. Wings cinereous; veins black; ulna less than half the length of the humerus; radius longer than the ulna; cubitus moderately long.

Length of the body 4 lines; of the wings 7 lines.

32. Smiera terminalis.

Mas.—Lutea; antennæ piceæ, filiformes, subtus rufescentes, scapo luteo; mesothorax nigro-quadrimaculatus; abdomen supra nigrum; pedes coxis posticis supra, femoribus posticis apice, tibiisque posticis basi apiceque nigris; alæ anticæ cinereæ, apice nigricantes.

Male.—Luteous. Antennæ piceous, filiform, reddish beneath; scape luteous. Mesothorax with an elongated black spot on the scutum, and with a black callus at the base of each fore-wing; scutellum armed with two very small teeth, adorned with a black disk. Petiole slender, longer than the metathorax. Abdomen elliptical, shorter and narrower than the thorax, black above, except towards the base; hind-coxæ black above, except towards the base; hind-femora with black tips, moderately incrassated, armed with about sixteen very minute teeth; hind-tibiæ black at the base and towards the tips. Wings cinereous. Fore-wings with blackish tips; veins black; ulna about half the length of the humerus; radius longer than the ulna; cubitus very short.

Length of the body 3 lines; of the wings 5 lines.

33. Smiera æqualis.

Mas.—Flava; caput posticè nigrum; antennæ nigræ, scapo flavo; mesothorax vittis tribus latis, parapteris ex maxima parte, scutellique macula tetragona nigris; abdomen strigis lateralibus transversis nigris; pedes postici coxis nigro-unimaculatis, femoribus nigro-trimaculatis; alæ cinereæ.

Male.—Yellow. Head black behind. Antennæ black, filiform;

scape yellow. Mesothorax with three broad black stripes, one on the scutum and one on each of the parapsides; paraptera mostly black; scutellum with a tetragonal black spot, which is attenuated in front. Petiole linear, much longer than the metathorax, and more than half the length of the abdomen. Abdomen elliptical, much shorter and narrower than the thorax, with some transverse black streaks on each side. Hind-coxæ with a black spot on the outer side; hind-femora with three black spots on each side, armed beneath with several minute teeth. Wings cinereous; veins black; ulna a little more than half the length of the humerus; radius as long as the ulna; cubitus very short.

Length of the body $2\frac{1}{2}$ lines; of the wings 4 lines.

34. *Smicra contributa.*

Mas.—Flava; caput macula antica nigra; antennæ nigræ, subtus rufescentes, scapo flavo; prothorax fascia abbreviata nigra; mesothorax niger, vittis duabus maculisque duabus exterioribus flavis, scutello flavo, macula postica nigra; pedes postici coxis femoribusque nigro-vittatis, tibiis posticis basi apiceque nigris; alæ cinereæ.

Male.—Yellow. Head paler in front, with a black spot between the base of the antennæ and the mouth. Antennæ black, filiform, reddish beneath, shorter than the thorax; scape yellow. Prothorax with a black abbreviated band in front. Mesothorax black; scutum with two yellow stripes, which converge hindward; parapsides yellow towards the fore-wings; scutellum yellow, with a black spot hindward, armed with two very minute teeth. Petiole a little shorter than the metathorax. Abdomen fusiform, black above, except towards the base, much shorter and narrower than the thorax. Hind-coxæ with a broad black stripe on each side; hind-femora with a black stripe on each side, that on the inner side interrupted; teeth numerous, very minute; hind-tibiæ black at the base and towards the tips. Wings cinereous; veins black; ulna hardly half the length of the humerus, which is yellow; radius fully as long as the ulna; cubitus very short.

Length of the body 3 lines; of the wings 5 lines.

35. *Smicra celsa.*

Fem.—Lætè flava; antennæ nigræ, scapo subtus flavo; mesothorax scuti macula trigona, strigis duabus parapsidum, paraptcris apud margines, scutellique vitta interrupta nigris; metathorax fascia angulata nigra; pectus nigrum; abdomen

fasciis quinque apiceque nigris; pedes nigro-varii; alæ cinereæ.

Female.—Bright yellow. Antennæ black, filiform, not longer than the thorax; scape yellow beneath. Mesothorax with a black triangular mark on the scutum, and with a black streak on each of the parapsides; paraptera bordered with black; scutellum with an interrupted black stripe. Metathorax with an angular black band. Mesopectus and metapectus black. Petiole not longer than the metathorax. Abdomen lanceolate, pubescent towards the tip, longer and narrower than the thorax, with five black bands, which are æneous on each side, tip black. Legs pubescent; hind-coxæ with a black spot on the outer side and with black tips; hind-trochanters black; hind-femora with many minute teeth, and with one large tooth near the base, black at the base and at the tip, with a black transverse spot on the middle of the outer side; hind-tibiæ black at the base. Wings cinereous; veins black; ulna about half the length of the humerus; radius as long as the ulna; cubitus very short.

Length of the body $3\frac{1}{2}$ lines; of the wings 6 lines.

36. *Smiera detracta.*

Mas.—Flava; antennæ nigræ, subtus rufescentes, scapo subtus flavo; abdomen luteum, fasciis quinque obscurioribus; pedes postici lutei; alæ limpidæ.

Male.—Yellow. Abdomen and hind-legs luteous. Antennæ black, filiform, reddish beneath; scape yellow beneath. Scutellum of the mesothorax armed with two extremely small teeth. Petiole nearly as long as the metathorax. Abdomen slightly lanceolate, much shorter and narrower than the thorax, adorned with five darker bands on the fore-borders of the segments. Hind-femora armed with one large and twelve very minute teeth, which are mostly black. Wings limpid; veins piceous; ulna about half the length of the humerus; radius a little longer than the ulna; cubitus very short.

Length of the body $2\frac{3}{4}$ lines; of the wings $4\frac{1}{2}$ lines.

37. *Smiera annulifera.*

Fœm.—Nigra; caput anticè flavum; antennæ apice subtusque rufæ, scapo subtus flavo; prothorax fascia flava nigro-biguttata; mesothorax segmentis flavo-marginatis, scutello

flavo, fasciis duabus vittaque nigris; petiolus brevissimus; pedes flavi, femoribus posticis nigris flavo-fasciatis, tibiis posticis nigris; alæ cinereæ, striga costali apicibusque fuscis.

Female.—Black. Head yellow about the eyes and in front. Antennæ filiform, red at the tips and beneath; scape yellow beneath. Hind border of the prothorax with a yellow band, which on each side is dilated and forked, and contains a black dot. Scutum and parapsides of the mesothorax bordered with yellow on the outer side; a large black spot on each of the yellow paraptera; scutellum yellow, armed with two short teeth, adorned with two black bands, which are connected by a black stripe; first band semicircular, much broader than the second. Petiole very short. Abdomen lanceolate, much narrower but very little longer than the thorax. Hind-femora adorned with a curved transverse yellow line on each side near the tips, armed with about twelve very minute teeth; hind-tarsi and anterior legs yellow. Wings cinereous, brown along the ulna and towards the tips; veins black, ulna less than half the length of the humerus; radius much longer than the ulna; cubitus moderately long.

Length of the body 3½ lines; of the wings 6 lines.

38. *Smicra depicta.*

Fœm.—Flava; caput posticè nigrum; antennæ nigræ, apice rufescentes, scapo subtus luteo; mesothoracis segmenta nigra, flavo latè marginata; abdomen luteum; pedes postici coxis femoribusque apice nigris; alæ cinereæ.

Female.—Luteous. Head and thorax yellow. Head black behind. Antennæ black, slender, filiform, dark reddish at the tips; scape luteous beneath; scutum and parapsides of the mesothorax black, broadly bordered with yellow; paraptera black towards the scutum; scutellum armed with two very short teeth, adorned with a large black spot, which is acutely angular towards the scutum. Petiole stout, much shorter than the metathorax. Abdomen lanceolate, narrower and a little longer than the thorax; sheaths of the oviduct with black tips. Hind-coxæ and hind-femora with black tips; hind-femora armed with one large and with about twelve very minute teeth, which are mostly black. Wings cinereous; veins piceous; ulna about half the length of the humerus; radius longer than the ulna; cubitus short.

Length of the body 4½ lines; of the wings 8 lines.

39. *Smiera annexa.*

Fœm.—Flava; caput posticè nigrum; antennæ nigræ, apice subtusque rufescentes, scapo flavo; prothorax nigro-bipunctatus; mesothoracis segmenta nigra, flavo-marginata; abdomen piceum, basi flavescens; pedes postici coxis apice tibiisque basi nigris, femoribus nigro-bimaculatis; alæ anticæ cinereæ, apud costam subluridæ.

Female.—Yellow. Head black behind and about the ocelli. Antennæ reddish, black above, except towards the tips; scape yellow. Prothorax with an elongated black point on each side by the hind-angle. Scutum and parapsides of the mesothorax black, broadly bordered with yellow; paraptera black towards the scutum; scutellum armed with two short teeth, adorned with a black spot, which forms a short transverse ellipse. Petiole piceous towards the tip, as long as the metathorax. Abdomen piceous, elongate-oval, yellowish towards the base, much shorter and narrower than the thorax. Hind-coxæ with black tips; hind-femora with twelve minute teeth, with two black spots beneath, the first extending from the first to the fifth tooth, the second apical; hind-tibiæ black towards the base. Wings cinereous, with a lurid tinge towards the costa; veins black; ulna hardly half the length of the humerus; radius longer than the ulna; cubitus rather short.

Length of the body 4 lines; of the wings 8 lines.

40. *Smiera cognata.*

Fœm.—Lutea; caput anticè flavum, posticè nigrum; antennæ piceæ, subtus apiceque rufæ, scapo flavo; thorax punctis duobus anticis, scuti vitta cyathiformi, parapsidum vittis duabus, parapteris ex parte, scutellique macula nigris; abdomen plaga postica nigricante; pedes postici coxis apice tibiisque basi nigris, femoribus nigro-bimaculatis; alæ cinereæ.

Female.—Luteous. Head yellow in front, black behind and between the ocelli. Antennæ piceous, filiform, red beneath and towards the tips; scape yellow. Prothorax with a black point on each side. Scutum of the mesothorax with a cyathiform black stripe; a black stripe on each of the parapsides; paraptera yellow, black where they approach each other; scutellum with a large black spot on the disk, armed with two very short teeth. Petiole as long as the metathorax. Abdomen elongate-oval, very much shorter and narrower than the thorax, with a blackish patch

on the hind part above. Hind-coxæ with black tips; hind-femora armed with eleven small teeth, adorned on each side with an apical black spot, and on the outer side with a black spot near the base; hind-tibiæ black towards the base. Wings cinereous; veins black; ulna a little less than half the length of the humerus; radius a little longer than the ulna; cubitus short.

Length of the body 4 lines; of the wings 8 lines.

41. *Smiera demota.*

Fœm.—Flava; caput posticè nigrum; antennæ ochraceæ, basi supra piceæ; prothorax fascia antica punctisque duobus posticis nigris; scuti discus, parapsidum vittæ duæ latæ, paraptera ex parte, scutellique macula conica nigra; abdomen rufescens nigro-quadrifasciatum, apice flavum; pedes postici piceo-strigati; alæ anticæ cinereæ, apud costam subluridæ.

Female.—Yellow. Head black behind. Antennæ filiform, ochraceous, piceous towards the base above. Prothorax with a black band in front, and with a black point on each side hindward. Scutum of the mesothorax black, except along the outer side; a broad black stripe on each of the parapsides; paraptera partly black; scutellum with a conical black spot. Petiole a little longer than the metathorax. Abdomen fusiform, a little longer and very much narrower than the thorax, reddish except towards the tip, with four black bands, of which the 1st and the 4th are interrupted. Hind-coxæ with a piceous streak on the outer side; hind-femora with a piceous streak on the inner side, armed with several minute teeth. Wings cinereous. Fore-wings with a lurid tinge towards the costa; veins piceous; ulna about half the length of the humerus; radius as long as the ulna; cubitus moderately long.

Length of the body 4 lines; of the wings 7 lines.

42. *Smiera apparata.*

Fœm.—Lutea; caput anticè flavescens, linea postica transversa nigra; antennæ nigræ, basi rufescentes, scapo flavo; prothorax linea transversa interrupta nigra; mesothorax segmentis nigris luteo-marginatis, scutello luteo macula tetragona nigra; abdomen nigrum, basi luteum; pedes coxis posticis apice nigris, tibiis posticis linea abbreviata nigricante; alæ cinereæ, apud costam subluridæ.

Female.—Luteous. Head pale yellowish in front, with a black transverse line behind the vertex. Antennæ black, reddish

towards the base, slightly increasing in thickness towards the tips; scape yellow. Prothorax with a black transverse interrupted line. Mesothorax with the scutum and the parapsides black, bordered with luteous; paraptera black except on the outer side; scutellum with a black tetragonal spot, armed with two small teeth. Petiole linear, fully as long as the metathorax. Abdomen lanceolate, black, luteous towards the base, narrower but not longer than the thorax. Hind-coxæ black towards the tips; hind-femora armed with several minute black teeth; hind-tibiæ with a blackish abbreviated line on the upperside. Wings cinereous, with a lurid tinge towards the costa; veins tawny; ulna rather more than half the length of the humerus; radius a little longer than the ulna; cubitus rather short.

Length of the body 5 lines; of the wings 9 lines.

43. *Smiera deducta.*

Fœm.—Flava; caput gutta antica fasciaque postica nigris; antennæ nigræ, scapo subtus flavo; mesothorax scuti disco, parapsidum vittis duabus, parapteris, scutellique macula conica nigris; pectoris discus niger; abdomen fasciis tribus connexis apiceque nigris; pedes postici coxis, femorum maculis duabus, tibiisque basi nigris; alæ cinereæ.

Female.—Yellow. Head black behind, and with a black dot between the base of the antennæ and the mouth. Antennæ black, slightly increasing in thickness to the tips; scape yellow beneath. Scutum of the mesothorax black, except along each side; parapsides black along the inner side; paraptera black; scutellum with a black conical spot which rests on the hind-border. Metathorax with a black transverse line at the base. Disk of the pectus black. Petiole not longer than the metathorax. Abdomen lanceolate, much longer and narrower than the thorax, with three black connected dorsal bands, the 3rd band connected with the apical black part, which comprises about two-fifths of the whole length. Hind-coxæ black; hind-femora armed with several very minute teeth, adorned with two black spots, which are connected below on the outer side; hind-tibiæ black at the base. Wings cinereous; veins black; ulna a little more than half the length of the humerus; radius as long as the ulna; cubitus very short.

Length of the body 2 lines; of the wings 3 lines.

44. *Smiera attacta.*

Fœm.—Flava; caput posticè nigrum; antennæ nigræ, subtus rufescentes, scapo flavo; prothorax gutta antica nigra; meso-

thorax guttis duabus vittaque, strigis duabus guttisque duabus posterioribus, vittaque scutelli nigris; pedes postici coxis nigro-guttatis, femoribus apice nigris; alæ limpidæ.

Female.—Yellow. Head black behind. Antennæ black, reddish beneath, slightly increasing in thickness to the tips; scape yellow. Prothorax with a black dot in front. Scutum of the mesothorax with a black dot on each side in front and with a black stripe; a black streak on each of the parapsides and a black dot on each of the paraptera; scutellum with an abbreviated black stripe. Metathorax with a black stripe. Petiole as long as the metathorax. Abdomen lanceolate, pale reddish, much narrower but hardly longer than the thorax; hind-borders of the segments paler. Hind-coxæ with a black spot on the outer side; hind-femora with black tips, armed with many very minute teeth. Wings limpid; veins black; ulna little more than one-third of the length of the humerus; radius a little longer than the ulna; cubitus very short.

Length of the body 3 lines; of the wings 4 lines.

Genus Chalcis.

Chalcis eurytomoides.

Fœm.—Nigra; antennæ robustæ, scapo flavo; thorax callis duobus flavis, scutello inermi; abdomen subsessile, sublanceolatum; pedes flavi, coxis posticis supra nigris, femoribus posticis nigro-fasciatis, femoribus anterioribus basi nigris, tibiis anterioribus nigro-strigatis; alæ cinereæ.

Female.—Black. Antennæ stout, filiform; scape yellow. Thorax with a yellow callus at the base of each fore-wing; scutellum unarmed. Abdomen subsessile, slightly lanceolate, longer and a little narrower than the thorax. Legs yellow; hind-coxæ black above; hind-femora armed with about six very minute teeth, adorned with a broad black band which extends above to the base and on the lower side to the tip; anterior femora black towards the base on the outer side; anterior tibiæ with a black streak on the outer side. Wings cinereous; veins black; ulna more than half the length of the humerus; radius less than one-third of the length of the ulna; cubitus very short.

Length of the body $4\frac{1}{2}$ lines; of the wings 7 lines.

Note.—I am indebted to Mr. Dunning for observing that I have applied the name *Sosietra* to two genera of insects. See Trans. Ent. Soc., Third Series, Vol. I. pp. 84, 370. The name *Eudosinna* may be substituted for *Sosietra*.

VII. *Notes on the Genus* Hydaticus (*Leach*), *with Descriptions of new Species.* By the Rev. Hamlet Clark, M.A., F.L.S., V.-P. Ent. Soc.

[Read 1st August, 1864.]

During Dr. Schaum's late visit to England, he was good enough to propose to me that we should combine together to prepare a complete and accurate Catalogue of all the known species of *Hydrocantharidæ*, with the object of offering our manuscript to the trustees of the British Museum as a second edition of their Catalogue of this interesting group (the first edition, prepared in 1847 by Dr. Schaum and Mr. Adam White, having long since been exhausted): very willingly I accepted his suggestion, and hence have occupied myself in examining the exotic species of the different genera, being not without hope that the Museum authorities would receive such a contribution, especially as Dr. Schaum has, with infinite labour, succeeded in mastering the most difficult portion of the work, the elucidation and determination of the *European* species, for his forthcoming volume of Erichson's Naturgesch. d. Ins. Deutschl. The following notes are the result of my examination of the species of *Hydaticus*, a genus which, in coloration of the forms composing it, is the most beautiful of all. I ought to add, that Dr. Gray, some months ago, most liberally placed at my disposal for examination the undescribed species of the genus in the Museum Collection. At that time, however, I was unable to enter upon the subject, and therefore returned the specimens. The following paper, being prepared in the country, does not contain descriptions of those new species referred to in the British Museum Catalogue under manuscript names.

It is worthy of remark, that the most important additions that have been made during the last few years to my collection of this group have been made by *non*-entomological friends residing abroad, who have kindly interested themselves in sending home, from time to time, the results of their examination of their respective neighbourhoods. Englishmen, like water-beetles, are found in every region of the globe. There are few Entomologists who have not one or more friends living for a time in some foreign

country. If only these could be induced to pay attention to the beautiful forms of insect-life around them, the advantage would be twofold: not only would they find, to their surprise, that such a rational pursuit would beguile many weary hours, and give real interest to a locality which perchance otherwise would be the opposite of interesting, but science itself would be the gainer, for we might thus obtain some knowledge of the life-history of insects of which at present we know nothing, except the external forms. When we are told that upwards of thirty species of *Coleoptera* have been found in the court of the British Museum itself, in the very heart of London, we may be sure that there is no spot on the earth, however apparently uninviting, that will not amply repay investigation.

1. *H. Bakewellii*, n. sp. (Pl. XIV. fig. 1.)

Ovalis, depressus, niger, flavo-maculatus: *capite* flavo, ad apicem vel nigro-bimaculato, vel omnino nigro; *thorace* nigro, lateribus vittâque transversali in medio interruptâ flavis; *elytris* ovalibus, pone medium depressis, subtilissimè punctatis, punctorum etiam seriebus duabus obscuris (hâc juxta medium penitus obsoletâ), nigris, maculis utrinque 4 flavis magnis, 1ma ad scutellum subcirculari, 2nda apud humeros juxta marginem longitudinaliter inæquali, 3a fascia lata pone medium (haud suturam attinente) transversim disposità, 4ta subcirculari juxta apicem, haud suturam sed marginem approximante, apice quoque subtiliter flavo-maculato; *antennis* flavis: *corpore subtus* nigro; *pedibus* rufo-flavis, femoribus posticis fuscis.

Long. corp. lin. 7; lat. lin. 4.

The species may be recognized by its tolerably even post-medial broad transverse bar of flavous, which, in form, is unlike that of any other species of the genus. I have received several examples at different times, which present only two forms of pattern; the typical one, of which the above is the diagnosis, and a *darker* pattern, in which all the maculæ are considerably reduced in size, and the transverse bar of the elytra commuted into two transversely-arranged spots. The transverse flavous bar of the thorax is also, in this latter pattern, obliterated.

This handsome species appears to be not uncommon in the neighbourhood of Moreton Bay, whence I have received it from my valued correspondent, Mr. Diggles. I name it after my friend R. Bakewell, Esq., who kindly supplied the first example to my

collection, and to whose courteous liberality I am much indebted for assistance in my entomological researches.

In the cabinets also of the British Museum, and R. Bakewell, Esq.

2. *H. bihamatus* (Esch. Dej. Cat.); Aubé (Spec. Gen. 174).

This species is the same as *H. Goryi*, Aubé (Spec. Gen. 175), and also is identical with *H. scriptus* of Blanchard in Homb. et Jacq.;* the insect has a very extended range, being found in the Philippine Islands (whence I have received it from Mr. Thorey), in Aru (taken by Mr. Wallace), New Holland, Moreton Bay (received at different times by Mr. Stevens), Amboina, in New Guinea, Batchian and Ceylon. I have also a fine series of the insect taken by the late lamented M. Mouhot, in Cambodia, in which the flavous markings are almost entirely absent.

3. *H. Adamsii*, n. sp.

Latè ovatus, satis rotundatus, medio dilatatus, fusco-cinereus, flavo-irroratus: *capite* flavo, ad basin transversè nigro, etiamque apud medium macula angulata litteram V formanti; *thorace* flavo, antice tenuiter et ad basin latius nigro-marginato; *scutello* nigro; *elytris* latis, nigris, levibus, nitidis; undique punctorum tres series apparent, puncta ipsa rara, haud profunda, aliquando (et præsertim serie 3ª ad marginem) obsoleta; elytra multitudine macularum minutarum irrorata sunt; maculæ confertæ, flavæ, juxta latera et basin confluentes; margines ipsi flavi, sutura tenuiter nigra apparet: *corpore subtus* nigro; *pedibus* rufo- vel fusco-flavis, tarsis tibiisque posticis nigris; *antennis* rufis.

Long. corp. lin. 6½; lat. lin. 4.

A species which at first sight reminds us of the European species *H. bilineatus*, De Geer; but while in general pattern it exactly resembles this species, it is entirely distinct: in size it is much shorter (6½ lin. instead of 7¼ lin.), the head is less produced, the apical margination is narrower and the basal broader, and the underside is black instead of rufo-flavous.

I received this form with other interesting species from Mr. Adams, who took two specimens of it on the coast of China. I

* I believe that *H. pacificus* also of M. Aubé (Spec. Gen. 177) will ultimately prove to be but a variety of it. I have in my cabinet one or two examples of *H. bihamatus*, which almost accurately agree with his description of *H. pacificus*.

with many others have to thank Mr. Adams for much precious information respecting species of eastern Coleoptera.

4. *H. quadrivittatus*, Blanchard (Voy. au Pôl. Sud. p. 48, pl. iv. fig. 3).

I have examined carefully all the reputed examples of this insect in the British Museum, as well as in the cabinet of Mr. Bakewell and my own, and confess that I am unable to discover, either by examples within my reach or by Blanchard's description, any material difference between this form and the widely dispersed and somewhat variable *H. vittatus* of Fabricius; the two are identical in size and shape and degree of punctuation; the only difference seems to me to consist in the character of the longitudinal marking, which in *H. vittatus* is expressed by one broad marginal band, more or less longitudinally interrupted from the shoulder, and in *H. 4-vittatus* by two marginal bands with some little interval between them: how nearly the two approach each other it does not require the aid of a long series of examples to discover; in *4-vittatus* the bands are parallel to each other, the outer one being considerably abbreviated; in *vittatus* the two bands are medially confluent. Whether, however, the two forms may ultimately prove to be distinct or not, the retention of the two names may be desirable; the former representing a modification of the external marginal band which only obtains in Australasia. Blanchard gives as the nearest affinity to his insect *H. Hybneri* of Europe, with which it has very little indeed in common.

5. *H. aruspex*, n. sp.

Oblongo-ovalis, parallelus, punctato-striatus, subnitidus, niger: *capite* flavo, ad basin latè nigro (inter oculos, apud vittæ nigræ marginem, flavo-bimaculato); *thorace* lateribus rotundatis, marginem juxta undique impresso, et anticè transversè (sed obsoletè et tenuiter) depresso, et punctato; quoad colorem flavo, ad basin latè et transversè nigro (vitta nigra ad medium lata, latera versus tenuior, haud margines attinet); *scutello* transverso-triangulari, nitido, nigro; *elytris* parallelis, crebre subtilissimè punctatis, etiamque seriebus 3 punctorum (quorum externa penitus obsoleta est) ornatis, colore nigris, marginibus undique latè et æqualiter a humeris penitus ad apicem flavis; *corpore subtus* nigro-fusco; *pedibus* rufis; *antennis* rufo-flavis.

Long. corp. lin. $6\frac{1}{4}$; lat. lin. $3\frac{3}{4}$.

Parallel in form, like *ruficollis*, Fab., though much narrower than that insect: the species before us is remarkable also by its broadly flavous or testaceous thorax combined with the uniform blackness of the elytra, relieved only by the broad and evenly-disposed flavous margination, which extends from the humeral angles nearly to the apex.

I obtained a single example some years ago in the Gory Collection, from China.

6. *H. verecundus*, n. sp.

Ovalis, parallelus, punctato-striatus, nitidus, niger, flavo-notatus: *capite* flavo, ad basin transversè nigro, inter oculos maculæ duæ flavæ triangulares, sese attingentes, apparent; *thorace* brevi, lateribus rotundatis, anticè transversè tenuiter depresso, flavo, marginibus antico posticoque latè nigris (margo anterior, latitudine æqualis, haud latera attinet; margo basalis, ad medium anteriore latior, sensim angustior fit, et tenuis latera pertingit); *scutello* triangulari, nigro; *elytris* sat parellelis (pone medium sublatioribus), apice rotundato, haud attenuato; punctorum tres series undique apparent, puncta distantia, minime profunda, attamen perspicua et in seriebus 2nda et 3ia minus obsoleta; quoad colorem elytra nigra apparent; vitta basalis a scutello ad humeros extendit, haud basin attingens, tenuis, æqualis, recta (aut *sub*-circularis et ad marginem medium leviter sese flectens), ad vittæ terminum margo usque ad humerum latè flavescit; pone medium inter seriem punctorum 5am et marginem macula flava apparet, subquadrata aut aliquando in duas divisa; ad apicem quoque altera, major, figurâ et staturâ incerta (nunc macula insularis ad ipsum marginem, nunc vitta transversalis, inæqualis, communis, lata, et ad apicem ipsum pertingens): *corpore subtus* nigro-fusco; *antennis* flavis; *pedibus* flavis, posticis fuscis et flavo-annulatis.

Long. corp. lin. 4; lat. lin. $2\frac{1}{3}$.

One of the smallest species of the genus; and to be also recognised by its more than usually distinct punctuation, as well as by the pale regular transverse band on its black elytra. It is nearly allied to a species in my collection, "*basalis*, Dej.," from North America, but much smaller. I am sorry to say that the two examples in my possession forbid me to register the habitat of this insect with certainty: one of them is labelled South America, the other (from the Gehin Collection) Java.

7. *H. Bowringii*, n. sp. (Pl. XIV. fig. 3.)

Ovalis, convexus, haud parallelus, latus, sat rotundatus, punctatus, niger, flavo-maculatus : *capite* inter oculos supernè undique impresso, flavo, basi latè transversè nigro ; *thorace* subtilissimè punctato, anticè punctis etiam majoribus sparso, flavo, margine basali nigro, ad medium latiori, margine frontali etiam nigro sed attenuatiori, et plerumque haud latera attingenti ; *elytris* latis, sat rotundatis, subtilissimè punctatis, punctis etiam seriebus duabus ordinatis majoribus (serie externâ aliquando obsoletâ), nigris, vittis undique duabus maculâque flavis—vittarum hâc mediâ, inter strias 1am et 2dam, lineari, cum suturâ subparallelâ, et marginem juxta apicem penitus attinenti, illâ marginali sed haud marginem attingenti, a humeris usque ad apicem productâ—maculâ apud scutellum undique circulari insulari, inter suturam et striam 1am : *corpore subtus* rufo-fusco ; *pedibus* rufo-flavis, femoribus posticis rufo-fuscis ; *antennis* rufo-fuscis, articulorum basibus flavis.

Long. corp. lin. $7\frac{1}{2}$—7 ; lat. lin. $4\frac{1}{2}$—$4\frac{1}{4}$.

I received a single example of this species from the Gory Collection some years ago, taken in New Holland ; more recently it has been taken by Mr. Diggles at Moreton Bay ; and also on the coast of China by Mr. Adams, to whose great kindness I am indebted for a fine series. It was taken also by Mr. Bowring, to whom I dedicate the species.

In the cabinets of the British Museum, Dr. Schaum and the Rev. H. Clark.

8. *H. decorus*, Klug (Symbolæ Physicæ, tab. xxxiii. fig. 5). (Pl. XIV. fig. 4.)

The figure of this species had already been engraved for me by Mr. Robinson, when Dr. Schaum informed me of an admirable figure that already existed of it in Klug's magnificent folio ; the species, however, well deserves a repetition of figure, not only on account of the costliness of Klug's work, but also of the extreme apparent rarity of the insect, as well as its beauty of coloration.

The species is taken in Arabia.

9. *H. Ussherii*, n. sp. (Pl. XIV. fig. 2.)

Ovalis, postice depressus, obscure undique bi-punctato-striatus, niger vel rufo-niger, maculis quibusdam flavis : *capite* flavo, ad basin latè et transversè fusco ; *thorace* flavo, ad medium

(et præsertim apud basin) fusco-adumbrato, basi ipsa usque ad margines tenuiter fusco-nigra; *elytris* subparallelis, subtiliter undique puncta in striis duabus ordinata disponuntur; hæ striæ interdum penitus obsoletæ sunt; ad suturam etiam rare puncta minuta serie ordinata apparent; elytra nigra vel fusco-nigra, margo autem usque ad apicem ipsum rufo-flavus, vitta etiam transversa flava ad basin (hæc, formâ æquali, tenuis nec suturam nec marginem attinet); tres aliæ maculæ undique apparent (nec formâ distinctæ nec omnino flavæ sed nigro-maculatæ aut irroratæ), 1ma apud marginem ante medium, haud vittam mediam attinet, nigro-mixta, sed ad marginem omnino flava, 2da pone medium vitta arcuata haud suturam attingit, figurâ inæqualis, nigro-maculata, 3a ad apicem plaga etiam flava haud suturam attinet; *antennis* flavis: *corpore subtus* rufo-fusco; *pedibus* rufo-flavis, femoribus posticis fuscis.

Long. corp. lin. 7; lat. lin. $4\frac{1}{3}$.

A very distinct and well-marked species, and quite unknown to Dr. Schaum (to whom I sent a specimen for examination), as well as to myself, until it was received by me from my friend Mr. Ussher from Cape Coast Castle in 1863; Mr. Ussher reported that after many months of severe drought, during which time everything had been dried up, the early rains left a small puddle of dirty fresh water, not much bigger than an ordinary hat; one-third water, two-thirds mud and slime. This single little hole was absolutely alive with water-beetles: upwards of 300 specimens were taken from it by Mr. Ussher, chiefly of one or two common species; but among them this, with three or four other novelties. I dedicate it to its captor, in recognition of his ardent love of Entomology, and of his hearty efforts to aid his brother naturalists by enriching their collections with African species.

In the cabinets of Dr. Schaum and the Rev. H. Clark.

10. *H. paganus*, n. sp.

Oblongo-ovalis, parallelus, punctorum tri-serie ornatus, niger, nitidus: *capite* lævi, rufo, ad basin transversè nigro; *thorace* haud ad basin sinuato, anticè excavato, rufo-flavo, ad medium subtiliter fusco-adumbrato, marginibusque antico et postico nigris (hoc ad medium latiori, illo transverso æquali attenuato); *elytris* parallelis, sat productis, punctorum seriebus 3 (puncta intervallo distantia, haud profunda, et aliquando obsoleta

sunt), quoad colorem nigris, humeris (maculâ parvâ angulatâ) marginibusque irregulariter testaceis vel rufo-flavis: *corpore subtus* fusco-nigro; *pedibus antennis*que flavis, illorum femoribus tibiisque posticis fuscis.

Long. corp. lin. $6\frac{1}{2}$; lat. lin. $3\frac{1}{2}$.

Nearly allied to *H. Capicola*, Aubé (Spec. Gen. 196); but differing from it by its more parallel form and entirely rufo-flavous head and thorax; the elytra also, instead of being more or less flavous irrorated with black, are entirely black, the humeral angle being flavous, and also the line of margination, obscurely and interruptedly, but more distinctly flavous near the apex.

I have received a single specimen from the Gold Coast, through Mr. S. Stevens.

11. *H. matruelis*, n. sp.

H. sobrino (Aubé) valde affinis, sed elongatior, grandior, et notis distinctior; parallelo-ovalis, flavus, nigro-maculatus et irroratus: *capite* omnino flavo, margine basali tenuiter nigro; *thorace* formâ ut in *H. sobrino*, disco autem toto flavo; basi ad medium transversè et subtiliter nigra; *elytris* parallelis, lateribus vix rotundatis, subelongatis, punctorum seriebus 2 penitus obsoletis; flavo-testaceis, maculis subtilibus circularibus confertis ornatis; hæ maculæ apud discum medium confluunt, ita ut vitta transversa lata planè apparet (anticè suffusa, ad marginem posteriorem distinctè definita), apicem juxta etiam vitta attenuatior vix conspicua haud margines attinet; margine ipso undique tenuiter flavo: *corpore subtus* rufo-fusco; *pedibus* rufo-fuscis; *antennis* flavis.

Long. corp. lin. $4\frac{1}{4}$; lat. lin. $3\frac{1}{3}$.

Sufficiently distinct from the Madagascarian *H. sobrinus*. In general form it is decidedly larger, as well as more parallel in outline, and more marked in coloration. The head, instead of being fuscous with divers flavous markings, is entirely flavous, with a black transverse margin (the same as in *H. sobrinus*) at the base. The thorax also is different in pattern; it too is entirely flavous, with a narrow basal margin of black, instead of being medially and broadly transversely black, without any such basal margin. The elytra are comparatively narrower and *more parallel;* and while the manner of coloration is the same in both (that is, a flavous ground irrorated with thickly-aspersed circular black spots, and these spots, by becoming confluent, forming two transverse bars of black, medial and apical), in the species before

us, by reason of the post-medial irroration being less heavy and more sparingly distributed, these transverse bars are more clearly defined and obvious; in *form* they seem to agree the one with the other (the anterior margin is more or less suffused, and hence indistinct, while the posterior is more marked and more sharply defined; this posterior margin is obliquely transverse and wavy in outline, tending somewhat towards the apex as it approaches the suture; the suture also between the transverse bars is narrowly black); the *position*, however, of the medial band differs from that in *H. sobrinus*, being medial rather than post-medial.

I am indebted to my good friend Mr. Ussher, of the Commissariat, for a fine series of this species, which he took at Cape Coast Castle, in West Africa. Upwards of 100 specimens are before me, which present no variety in form or degree of coloration. They all appeared suddenly after rains, in a locality where there had been previously no water at all, and where a short time after all traces of water entirely disappeared.

12. *H. Leander*, Rossi (Fn. Etrusc. i. 212).

A species found in the south of Europe; and also, as it would seem, throughout the whole of Africa. Lucas reports it as found in Algeria, Aubé in Senegal, Boheman in Caffraria. In 1860 I received a series of a *Hydaticus* from Mr. Cuming from the White Nile, which I cannot but refer to this species: the question however is not without difficulty, for certainly there is a clearly-marked difference between my White Nile examples and the Caffrarian type which I have received from M. Boheman, as well as the ordinary European form. The examples before me are considerably shorter and relatively broader than the South African, and a trifle shorter as well as much paler than the ordinary European exponents: the basal marking of the thorax, referred to in Aubé's description and present in all other examples that have come before me, is absent in the White Nile specimens. I have not however sufficient evidence before me to warrant the erection of them into a separate species.

13. *H. grammicus*, Sturm (Germ. Fn. xiii. 1).

I am unable to separate from this well-known European species certain examples of the genus which were taken by Mr. Adams near the coast of China, and by Mr. Wallace in the Eastern Archipelago. The insect would seem hence to have not only a broad but a very unusual range. It is reported by Aubé as also found in Armenia.

14. *H. bivittatus*, Lap. (Etud. Ent. 97).

A species which, apparently confined to the South African region, is notable among its congeners (unless I am much mistaken) for the aberrations of pattern and variation in size which it presents; its typical character is well described by Aubé (Spec. Gen. 207). I have an example from the Cape, in which a broad and well-defined transverse basal band connects the medial longitudinal marking with the scutellum; and another example from Ovampo Land, Lake N'Gami, resembling in all respects the typical pattern, but strangely aberrant in size, being only $5\frac{3}{4}$ instead of 7 lines in length. The species differs from *H. vittatus* of Fabricius, and also (if this species be really distinct) from *H. 4-vittatus* of Blanchard, in the relative position of its two marginal bands, which never approximate (as in the former), and never are abbreviated (as in the latter), but are continued, each parallel to the other, to the apex of the elytra.

15. *H. stagnalis*, Fab. (Syst. El. i. 265); Aubé (Spec. Gen. 201).

This species would seem to have an extended range. Hitherto it has been known only in Europe, and as a rare species, but I have a single example, identical in all respects with the European form, from the Cape of Good Hope.

16. *H. vittatus*, Fab., var. (Pl. XIV. fig. 6.)

Dr. Aubé (Spec. Gen. 208) points out the variation of pattern which occasionally is met with in this common eastern insect. I received from Mr. S. Stevens some years ago two examples from North India, which, differing somewhat from each other, and also in some respects in puncturing from the usual type, present (as it seems to me) an additional and remarkable variety of pattern. Of the three rows of striæ-like punctures on the elytra, one only is apparent; and moreover there are certainly sparsely scattered punctures between the suture and the first stria which I cannot discover in any of the usual examples of *H. vittatus*, and which are not noticed in Aubé's excellent description. The peculiarity however of the variety before us consists in *the form of the flavous band:* it extends (as will be seen from the figure) from the margin to the region of the scutellum (the scutellum itself and a *narrow* border line of the elytra being black); it then narrows considerably (its inner boundary line crossing the first row of punctures obliquely), and is continued, parallel to the suture, as far as the apex; the outer boundary line leaves the

line of margination a little behind the shoulder; near the base a narrow longitudinal marking of black extends midway within the flavous band for about one-fifth of the length of the elytra. I agree with my friend Dr. Schaum that the form before us can only be viewed as an interesting and eccentric variety of *H. vittatus*, although in a considerable series of examples of this common species I possess no individuals which offer a connecting link between it and the normal pattern.

17. *H. parallelus*, n. sp.

Oblongo-subovalis, parallelus, punctato-striatus, rufo-niger, nitidus: *capite* impunctato, fusco, ad apicem rufo, rufâ etiam maculâ transversali brevi inter oculos (hæc fortasse aliquando maculis duabus contiguis divisa est); *thorace* lateribus rotundatis, anticè profundè excavato, basi subtiliter sinuato; juxta latus anterius fossa transversalis punctis minutis ornatur; ad latera et basin versus rimæ longitudinales velut acuductæ apparent; facies rufa vel rufo-brunnea, maculâ ad medium transversâ nigro-fuscâ adumbrata; *scutello* triangulari, lævi, nigro; *elytris* parallelis, subelongatis, seriebus 2 undique punctorum (punctis sparsis et minutis), fusco-rufis, ad latera rufo-irroratis, marginibus ipsis omnino rufis: *corpore subtus* fusco; *antennis* flavo-rufis; *pedibus* flavo-rufis, posticis rufo-fuscis.

Long. corp. lin. 6½; lat. lin. 3¼.

I believe that this species is distinct from *Hydaticus Capicola* of Aubé, though the foregoing diagnosis will show that the two are closely allied; and I am confirmed in this opinion by a note which I made some years ago, that the species before us was almost (probably quite) identical with a MS. species in the British Museum Collection, *Fordii** (Brit. Mus. Cat. Hydrocan. p. 18). Now *Fordii* (ranked, by the by, accidentally in the British Museum Catalogue as a *Colymbetes*, instead of a *Hydaticus*) was thus named by Dr. Schaum as a new species when he had also before him *H. Capicola*, Aubé. I have thus his excellent authority for erecting it into a separate species. The insect before us is *more parallel;* it is also larger in size, and the elytra are completely fuscous-black, the sides only being narrowly sprinkled with rufous; not "elytris rufo-testaceis, crebre nigro-irroratis," as in Aubé's description of his insect.

The range of the habitat of *H. parallelus* is, however, open to

* Unfortunately, in the Museum this species has been for the time mislaid. I am thus unable to verify my note by a second examination. I have no reason, however, to doubt its accuracy.

somewhat greater difficulty. I have in my collection two examples almost identical in size and colouring, as well as in pattern; of these I received one from Mr. Stevens, from New South Wales, the history of the example being quite undoubted; the other I obtained at the dispersion of the Entomological Society's Collection in 1858, labelled Cape of Good Hope! It would naturally have been supposed that one of these labels must be incorrect. We have clear evidence, however, that *H. Capicola*, Aubé, originally from the Cape, is found at Moreton Bay (twice I have received examples from that locality); and if *Capicola* is common to both continents, *H. parallelus* may be well supposed to be common to both continents also.

18. *H. nigro-marmoratus*, n. sp.

Oblongo-ovalis, depressiusculus, lævis, rufo-testaceus, nigro-maculatus: *capite* rufo, ad basin transversè et ad interiorem oculorum marginem nigro; *thorace* lato, subtilissimè punctulato, anticè excavato (angulis anticis prominulis et acutis), ad basin sub-sinuato; quoad colorem rufo-testaceo, ad basin tenuiter nigro; *scutello* triangulari, lævi, nigro; *elytris* sat latis et ad apicem sat acuminatis, undique seriebus punctorum rarorum tribus distinctis ornatis, rufo-testaceis, suturâ æqualiter et seriebus macularum 3 inæqualibus nigris; hæ maculæ sinuatæ, longitudinaliter productæ, interruptæ, in vittis apud punctorum series elytra ornant, et puncta ipsa plerumque maculis minoribus circularibus cinguntur: *corpore subtus* fusco; *pedibus* flavis, tibiis posticis fuscis; *antennis* flavis.

Long. corp. lin. 6; lat. lin. 3¼.

A single specimen of this fine African species I received for examination, through the kindness of my friend Mr. John Gray, when at Lisbon, from Dr. Bocage, the head of the National Museum. It was received by him from Angola.

H. nigro-marmoratus will take its place near *H. Dregii*, which it generally resembles in pattern; it is however abundantly distinct: the sutural line is very evenly black; along the first row of punctures (which are distinct but widely separated) runs an uneven, irregular, longitudinal marking from the base to the apex (in some places broader than but for the most part about equal in breadth to the sutural marking); this is interrupted in front of the middle; the second longitudinal marking is more irregular still, it is placed rather within the second line of punctures, is narrower

than the first, and confluent with it near the base and apex; the punctures themselves (being on the outer side of this marking), and also the punctures of the third row, are each surrounded by a regular and circular marking; the third line of black coloration is between the second and third rows of punctures, and consists of three markings—one near the shoulder, which is confluent with the first at the base, one medial, which is shorter and more minute, and a third post-medial, which is much broader, extending from the second row of punctures to the margination; at the medial margination there is also another fuscous marking.

There is no other species of the genus known to me with which *H. nigro-marmoratus* can be confounded.

19. *H. fulvo-notatus*, n. sp.

Ovalis, depressus, nitidus, niger, fulvo-notatus: *capite* rufo, ad basin latè et transversè nigro; *thorace* anticè excavato, ad basin sinuato-rotundato, lateribus vix rotundatis, apicem versus transversè leviter punctato, nigro, lateribus latè flavo-rufis; *scutello* triangulari, lævi, nigro; *elytris* latis, subtilissimè punctatis, etiamque punctorum seriebus 3 nigris; basi, fasciâ post-mediâ, et apice rufo-flavis; basis fasciâ ornatur nec baseos marginem nec suturam attingenti, latiori ad latera, attenuatiori versus scutellum; fascia post-media interrupta est, latior ad marginem, deinde irregularis et angulata maculâ minori continuitur, maculâ secundâ etiam minori suturam mediam approximat; apicem juxta sed haud attingens, macula latior ad marginem, attenuatior versus (sed neque pertingens) suturam; margo quoque ipse flavus est: *corpore subtus* fusco; *pedibus* rufo-fuscis, anticis flavis; *antennis* flavis.

Long. corp. lin. $5\frac{1}{2}$; lat. lin. $3\frac{1}{2}$.

I received two examples of this pretty species from my friend Mr. Ussher, who took them with other *Hydatici* during the short rainy season at Cape Coast Castle, in Western Africa. The species may easily be recognized by the three transverse fulvous markings on its dark-coloured elytra.

20. *H. histrio*, n. sp. (Pl. XIV. fig. 5.)

Ovalis, modicè attenuatus, modicè convexiusculus, niger, flavo-ornatus: *capite* flavo, ad basin latè et transversè nigro; *thorace* nigro, ad latera latè flavo; *scutello* triangulari, nigro; *elytris* subparallelis, punctorum seriebus duabus undique

(punctis confertis, minutis, et inæqualiter dispositis), quoad colorem nigris, apud basin (sed baseos marginem haud omnino attingens) macula subtriangularis ante medium elytrorum inter strias 1am et 2dam sese dirigit, vitta etiam marginalis a humeris propemodum apicem attingit: *corpore subtus* nigro; *pedibus* flavis, posticis fuscis; *antennis* flavis.

Long. corp. lin. 6; lat. lin. 3.

A distinct species from northern India, an example of which I received some years ago in the Gory Collection. It is allied to *vittatus*, Fab., but besides being of a pattern which it seems almost impossible to place as an extreme variety of that variable species, it is manifestly narrower and more constricted in form.

21. *H. nigro-vittatus*, n. sp.

Ovalis, convexiusculus, sat latus, et ad latera nonnihil rotundatus: *thorace* leviter punctato et ad latera apud basin reticulato vel quasi irregulariter acuducto, quoad colorem testaceo-rufo, marginibus ad apicem et basin tenuiter nigris; *scutello* triangulari, lævi, nigro; *elytris* undique punctorum seriebus duabus (punctis raris et aliquando obsoletis), omnino subtilissimè et crebrè punctatis, testaceis vel rufo-testaceis; vittâ suturali alteràque (vel duabus approximatis) undique nigris; inter vittas et margines elytra quasi nigro-irrorata maculis subtilissimis sparguntur; hæ maculæ autem non confusè aggregatæ, sed plus minus ordinibus dispositæ sunt: *corpore subtus, pedibus*que rufo-fuscis.

Long. corp. lin. 5; lat. lin. $2\frac{1}{2}$.

Allied to *H. Leander* of South Europe, and, at first sight, only a variety of that species. The only example that I have seen was received by Mr. Wallace from Japan, and is in my collection.

DESCRIPTION OF PLATE XIV.

Fig. 1. *Hydaticus Bakewellii*, Clark.
Fig. 2. „ *Ussherii*, Clark.
Fig. 3. „ *Bowringii*, Clark.
Fig. 4. „ *decorus*, Klug.
Fig. 5. „ *histrio*, Clark.
Fig. 6. „ *vittatus*, Fab., var.

VIII. *Descriptions of uncharacterized Genera and Species of* Phytophaga. By J. S. Baly.

[Read 1st August, 1864.]

List of New Species.

1. *Lema gravida*..... Port Natal
2. *Clythra* (*Diapromorpha*) *Walleri*..... Zambesi
3. *Clythra* (*Peploptera*) *tibialis*..... Port Natal
4. *Doryphora Salvinii*.... Panama
5. *Ceralces Walleri*..... Zambesi
6. ,, *spilota*..... ,,
7. *Chrysomela* (*Atechna*) *Clarkii*..... ,,
8. *Australica* (*Stethomela*) *Parryi*..... Australia
9. *Gonioctena Murrayi*.. OldCalabar
10. ,, *Fortunei*... Northern China
11. *Gastrolina thoracica*... Japan
12. *Lina Adamsii*..... Chusan
13. *Plagiodera celestina*... HongKong
14. ,, *cuprea*..... Lake N'Gami
15. *Clitena* (n.g.) *limbata*.. Siam
16. ,, *melancholica*.. ,,
17. *Laphris*(n.g.)*emarginata* Northern China
18. *Cerochroa maculicollis*.. OldCalabar
19. *Lætana* (n.g.) *histrio*.. S. Africa
20. *Platyxantha*(n.g.)*apicalis* Sumatra
21. ,, *nigricornis* Java
22. ,, *ventralis*.. Singapore
23. *Doridea* (n.g.) *insignis* Tringanee
24. *Theopea* (n.g.) *pulchella* Sumatra
25. ,, *elegantula*.... Sarawak
26. ,, *Mouhoti*..... Siam
27. *Atysa* (n.g.) *terminalis* Mysol
28. *Alopena* (n.g.) *collaris* NewGuinea
29. *Calopepla Livingstonii*. Zambesi
30. *Dolichotoma Salvinii*.. Panama
31. *Mesomphalia Salvinii*.. ,,
32. *Batonota Godmanii*.... ,,

Fam. CRIOCERIDÆ.

Genus Lema, Fab.

Lema gravida.

Robusta, fulva, nitida; antennis (articulo basali excepto), thoracis puncto utrinque, elytrorum punctis sex, femoribus basi et apice, tibiis tarsisque nigris; thorace subquadrato, lateribus modice constrictis, vix pone medium transversim sulcato, dorso antico bifoveolato et ibi subcrebre punctato; elytris ampliatis, thorace multo latioribus, convexis, fortiter punctato-striatis, striis sulcatis, interspatiis convexis, ad apicem costatis.

Long. 4 lin.; lat. elytr. 2 lin.

Hab. Port Natal.

Antennæ slender, entirely filiform, half the length of the body. Thorax scarcely broader than long; transverse sulcation impressed in the middle with a distinct fovea, the rest of its surface covered with nearly obsolete transverse wrinkles; the two black spots are placed one on either side just behind the anterior angles. Elytra

broader with relation to the thorax than in any other species with which I am acquainted; the usual depression below the basilar space wanting; the black spots, three on each elytron, are arranged as follows, viz., one on the humeral callus, the second just before the middle of the disk, rather nearer the suture than the outer border, and the third nearly half-way between the middle and the apex of the elytron, placed in the middle of the disk.

Fam. CLYTHRIDÆ.

Genus Clythra, Fab.

Clythra (*Diapromorpha*) *Walleri*.

Elongata, cylindrica, postice paullo attenuata, nigra, subtus pube argenteâ adpressâ dense vestita; tibiis tarsisque obscure fulvis; thorace fortiter subcrebre punctato, apice lateribusque (illo medio interrupto) flavis; elytris grosse punctatis, utrisque plagâ basali inter callum humerale et suturam positâ, vittâ marginali a basi ad medium ductâ, ibi introrsum flexâ et fasciam transversam ante suturam abbreviatam formante, maculisque duabus subapicalibus, oblique transversim positis, flavis.

Long. 6 lin.

Hab. Zambesi River.

This species is most nearly allied to *D. argentata;* the thorax is rather less closely but more coarsely punctured, and the pattern both of thorax and elytra is different.

Clythra (*Peploptera*) *tibialis*.

Subconico-cylindrica, nitida, nigra, subtus cinereo-sericea; tibiis (basi exceptis) fulvis; thorace elytrisque obscure fulvis, illo lævi, vittâ latâ nigrâ, his distincte punctatis, punctis confuse striatim dispositis, utrisque maculis quatuor, duabus ante medium oblique, duabus vix pone medium (exteriori parvâ) transversim positis, nigris.

Long. 5 lin.

Hab. Port Natal.

Head slightly concave and rugose-punctate between the eyes; base of antennæ fulvous. Thorax very convex, smooth and impunctate, with the exception of two or three small foveæ on either side near the lateral margin; sides rounded and narrowed from base to apex. Scutellum broad, triangular. Elytra coarsely punctured, punctures near the suture arranged in irregular striæ.

Fam. CHRYSOMELIDÆ.

Genus Doryphora, Illig.

Doryphora Salvinii.

Ovata, valde convexa, sordide fulva, nitida; elytris sat fortiter gemellato-punctato-striatis, flavis, vitta suturali vix ante apicem maculam parvam coeunte, limboque laterali angusto postice fere evanescente, rufo-fuscis; utrisque maculis irregularibus novem, 1-3-3-2 positis, castaneis, instructis.

Long. 6 lin.

Hab. Panama.

Head broad, finely punctured, upper portion of face irregularly but at the same time lightly excavated. Antennæ slightly thickened towards their apex, terminal joints longer than broad. Thorax more than twice as broad as long, sides nearly straight and parallel, rounded and narrowed in front; apex deeply excavated, the anterior angles subacute; above strongly punctured, the punctures being irregularly scattered over the surface. Elytra broader than the thorax, subparallel along the sides, their apex regularly rounded; surface strongly punctured, the punctures being arranged in irregular gemellate striæ: the chestnut patches on the disc of each elytron are arranged as follows, viz., one in the middle of the base, three transversely before the middle, three immediately behind the latter, and two others also placed transversely just before the apex. Mesosternal spine more than half the length of the metasternum.

This new and beautiful species ought to be placed close to *Doryphora nigroguttata*, Stål.

Genus Ceralces, Gerst.

Ceralces ferrugineus, Gerst.

Some years ago I described in the Transactions of this Society (N. S. iv. 88) a species of *Ceralces* from Old Calabar, under the name of *Pseudomela Murrayi*; subsequently, on reading Gerstäcker's description, and seeing also the figure of his insect in Peters' Reise nach Mossambique, I concluded that the two species were identical, and that, from his name having the priority, mine must sink into a synonym.

The arrival, however, of a specimen of *C. ferrugineus* in the Zambesi Collection which is now before me, enables me to show that the two insects, although closely allied, are really distinct, and present clear points of difference.

In *C. ferrugineus* the thorax is more convex, and, together with the head, more coarsely punctured; the basal joints of the antennæ, instead of being entirely red, as in *C. Murrayi*, are obscure rufo-piceous; and the elytra are irregularly punctured over their whole surface. In *C. Murrayi* the elytra are irregularly punctured on the disk, but near the suture the punctures are arranged in longitudinal rows, the puncturing being also finer than in Gerstäcker's insect.

Ceralces Walleri.

Oblongo-ovata, convexa, rufo-fulva, nitida; antennis nigris, pectore, pedibus, antennarumque basi nigro-piceis; thorace elytris latitudine fere æquali, dorso leviter punctato, utrinque unifoveolato; elytris subcrebre punctatis, punctis prope suturam subseriatim dispositis.

Long. $4\frac{1}{2}$—5 lin.

Hab. Zambesi River.

Mouth nigro-piceous, epistome and vertex closely punctured; lower portion of face just above the epistome impressed with three short longitudinal grooved lines. Thorax twice as broad as long, nearly as broad at the base as the elytra, sides rounded and narrowed from base to apex; disk somewhat distantly, sides rather more closely, punctured.

The broad thorax at once distinguishes this species from either of the two mentioned above; the punctuation of the thorax is also much finer, more especially on the disk.

Ceralces spilota.

Breviter ovata, convexa, fulva, nitida; antennis extrorsum, oculis, thoracis maculis tribus transversim dispositis, elytrorumque maculis octo, harum quatuor infra basim et quatuor vix pone medium positis, nigris; scutello nigro-piceo; thorace transverso, irregulariter punctato; elytris crebre punctatis, punctis prope suturam in seriebus gemellatis dispositis.

Long. $3\frac{1}{2}$ lin.

Hab. Zambesi River.

In form of thorax and body closely resembling *C. Walleri;* rather shorter, however, and stouter than that species. Head coarsely punctured. Thorax feebly excavated on either side the disk. The black patches on the elytra, which are arranged in two transverse rows, vary in my specimens somewhat in size, and it is probable that in some individuals they are considerably enlarged

and cover a much greater portion of the elytra; in that case they would approach in pattern *C. ornata*, described by me from Lake N'Gami. The present species, however, is nearly twice the size of *C. ornata*, and much less coarsely punctured.

Genus Chrysomela, Auct.

Chrysomela (*Atechna*) *Clarkii*.

Ovato-rotundata, valde convexa, rufo-picea, nitida; pedibus obscurioribus; antennis nigris, capite thoraceque obscure rufis; elytris obscure rufo-violaceis, subfortiter punctato-striatis, interspatiis planis, subremote tenuiter punctatis; utrisque pustulis rotundatis quatuor 2-2 oblique positis flavis.

Long. $4\frac{1}{2}$ lin.

Hab. Zambesi River.

This lovely insect, the finest of the known species of *Atechna*, is at once to be distinguished from all its congeners by its much greater size; I have named it after my friend the Rev. H. Clark, who is just now engaged on a monographic paper of the genus *Atechna*.

The four spots on each elytron form two obliquely transverse rows on the disc; the first placed before, the second below the middle.

Genus Australica, Chevr.

Australica (*Stethomela*) *Parryi*.

Subquadrato-oblonga, parallela, valde convexa, cuprea, nitida, ænco-micans, subtus cupreo-ænea; antennis basi pedibusque obscure rufo-fulvis, illis apice nigris; elytris pone medium declivibus, apice angulatis, profunde punctatis, punctis in striis remote dispositis.

Long. $4\frac{1}{4}$ lin.

Hab. Australia.

Head smooth, impressed just above the epistome with a few deep foveæ. Clypeus fulvous, epistome fulvo-æneous. Thorax more than twice as broad as long, sides straight and nearly parallel, narrowed and rounded in front; disk smooth, very minutely punctured, impressed here and there on the sides and hinder half with large deep punctures, which have a metallic green reflexion. The punctures on the elytra, also metallic green, are similar in size to those of the thorax; they are arranged in nine rows, being placed at somewhat irregular and distant intervals in each row; in this respect they approach the punctation of *Stetho-*

mela gibbosa, but the punctures in the present species are much smaller and also closer than in that insect; on the side just below the shoulder is a large deep somewhat transverse excavation.

Genus Gonioctena, Redt.

Gonioctena Murrayi.

Oblonga, valde convexa, subparallela, fulva, nitida; mandibularum apice oculisque nigris; elytris castaneis, confuse punctatis.

Long. 3 lin.

Hab. Old Calabar.

Head somewhat closely punctured; thorax twice as broad at the base as long, sides rounded and narrowed from base to apex; apical margin obsoletely bisinuate; upper surface subremotely but distinctly punctured. Scutellum semirotundate. Elytra irregularly punctured.

Gonioctena Fortunei.

Breviter oblongo-ovata, convexa, pallide fulva, nitida; oculis mandibularumque apice nigris; thoracis maculis duabus elytrorumque singulorum maculis sex, piceis; elytris punctato-striatis, interspatiis subcrebre punctatis.

Long. $2\frac{1}{2}$ lin.

Hab. Northern China.

Very nearly allied to *Gonioctena nigroplagiata*, but separated from that insect, in addition to the different number of spots on the elytra, by its shorter form, its pale scutellum, and more coarsely-punctured elytra.

Genus Gastrolina, Baly.

Gastrolina thoracica.

Oblonga, depressa, æneo-nigra, nitida; thoracis lateribus flavis; elytris fortiter subcrebre punctatis, interdum obsolete costatis, nigro-cæruleis aut purpureis, margine elevato lævi, æneo-nigro; abdominis apice piceo.

Long. $3\frac{1}{2}$ lin.

Hab. Japan.

This pretty species is perhaps only a local variety of *Gastrolina depressa:* it differs chiefly in the coloration of the thorax, which is in the present insect brassy-black with broad lateral margins; this character is constant, without the slightest attempt at variation. The raised vittæ, always more or less visible on the elytra of *G. depressa*, are usually obsolete in the present species.

Genus Lina, Redt.

Lina Adamsii.

Anguste oblonga, convexa, viridi- aut cæruleo-metallica, nitidissima; abdominis limbo, pedibus, thorace antennisque rufo-fulvis, his unguibusque extrorsum nigris; elytris subcrebre punctatis, viridi-æneis aut cæruleis.

Long. 4—5 lin.

Hab. Chusan. This beautiful insect was collected in some abundance by Messrs. Bowring and A. Adams. After this latter gentleman I have named it, as a slight token for his exertions in obtaining, and liberality in dispersing, the Phytophagous Coleoptera of Japan and Mantchuria.

In size this species approaches closely to *Lina cuprea*, but in sculpture and form of thorax, viz., in the absence of the thickened lateral border, it resembles *Lina ænea*. The totally different coloration will easily separate it from either insect.

Genus Plagiodera, Redt.

Plagiodera celestina.

Late ovata, modice convexa, rufo-testacea, nitida; vertice antennisque extrorsum nigris; elytris tenuiter subcrebre punctatis, cupreis.

Long. 2½ lin.

Hab. Hong Kong. Collected by Mr. Bowring.

Narrower and more ovate than *P. cinctipennis;* the elytra also more closely punctured and wanting the pale lateral border.

Plagiodera cuprea.

Ovata, valde convexa, cuprea, nitida; thorace disco tenuiter, irregulariter, lateribus rude, subcrebre punctato; scutello lævi; elytris confuse punctatis.

Long. 4½ lin.

Hab. Lake N'Gami.

Sides of thorax nearly straight and parallel behind, narrowed and rounded in front; scutellum semi-rotundate; elytra rather broader at their base than the thorax, their sides rounded.

Fam. GALLERUCIDÆ.

Genus Clitena.

Corpus elongato-oblongum, convexum, opacum, supra pube brevissimâ vestitum. *Caput* thorace insertum, perpendicu-

lare; *antennis* robustis, articulis 4to ad 11um modice dilatato-compressis; *oculis* ovatis, integris; *palporum* maxillarium articulo ultimo conico, acuto. *Thorax* transversus, irregulariter excavatus. *Elytra* thorace paullo latiora, parallela, convexa. *Pedes* modice robusti, simplices; *coxis* anticis fere perpendicularibus, contiguis; *femoribus* posticis non incrassatis, *tibiis* posticis apice inermibus, *unguiculis* bifidis. *Mesosternum* angustum, acutum.

Type *Clitena limbata.*

The dilated antennæ at once separate this genus from *Galleruca*, near to which it must be placed.

Clitena limbata.

Subelongata, subparallela, fulva, subtus nitida; pedibus (femorum basi excepta) obscure æneis; antennis nigris; thorace elytrisque crebre punctatis, obscure æneis, subopacis, illo limbo vittâque latâ centrali, his limbo angusto, fulvis.

Long. 5 lin.

Hab. Pachybouri, Siam. Collected by the late M. Mouhot.

Head coarsely punctured, front impressed by a longitudinal groove, which extends downwards as far as the apex of the epistome; just below the upper margin of the eyes it is traversed by a deep transverse groove, either extremity of which curves downwards and runs parallel with the inner edge of the eye; on either side, placed immediately above the insertion of the antennæ, is a smooth slightly-raised semi-lunate space, bounded above and outwardly by the transverse, within by the longitudinal, groove; antennæ more than two-thirds the length of the body; vertex marked with a large obscure viridi-æneous patch. Thorax twice as broad as long; sides nearly straight and parallel, narrowed and rounded in front, anterior angles produced into an obtuse tooth; surface rugose-punctate, impressed on either side with a short transverse excavation; middle of the disc impressed with a longitudinal groove, which extends from just behind the apical margin nearly to the base, its basal portion dilated. Elytra subparallel, scarcely dilated posteriorly, their apex broadly rounded, very closely punctured, and clothed with short adpressed hairs; on the surface of each elytron are three or four indistinct, nearly obsolete, raised vittæ.

Clitena melancholica.

Subelongata, convexa, nigra, subopaca; thorace rugoso, irregulariter excavato, elytris crebre punctatis, pube brevi adpressâ concolori dense vestitis.

Long. $5\frac{1}{3}$ lines.

Hab. Laos, Siam.

Head coarsely punctured, excavated on the front; antennæ more than two-thirds the length of the body, sixth and following joints compressed and dilated, ninth, tenth and eleventh very short, decreasing in width. Thorax scarcely twice as broad as long, sides rounded at the base, nearly straight and subparallel along their middle, thence quickly narrowed to the apex, anterior angles thickened; surface irregular and excavated. Elytra subparallel in front, scarcely dilated posteriorly, much more finely punctured than the thorax.

Genus Laphris.

Corpus oblongo-elongatum, convexum. *Caput* exsertum, facie perpendiculari; *antennis* modice robustis, filiformibus, articulo secundo brevissimo; *palporum* articulis duobus ultimis conjunctim ovatis. *Thorax* transversus, dorso utrinque transversim sulcatus. *Elytra* oblonga, irregulariter punctata. *Pedes* modice robusti; *coxis* anticis fere contiguis, perpendicularibus, *femoribus* posticis non incrassatis; *tibiis* posticis apice spinâ brevi armatis, *unguiculis* appendiculatis. *Metasternum* antrorsum ultra coxas intermedias productum.

Type *Laphris emarginata.*

Nearly allied to *Aplosonyx*, separated by the appendiculated claws and produced metasternum.

Laphris emarginata.

Oblongo-elongata, parallela, convexa, pallide fulva, nitida; oculis elytrorumque vitta lata, mox infra basin fere ad apicem extensa, extus sat profunde emarginata, nigris; antennis (basi exceptâ) fuscis.

Long. 5 lin.

Hab. Northern China.

Thorax nearly twice as broad as long, coarsely punctured, impressed in the middle of the base with a large fovea; sides nearly parallel, sinuate behind the middle, posterior angles produced, the anterior angles thickened and rounded, very obtuse. Scutellum smooth, triangular. Elytra convex, their apex slightly

dehiscent, indistinctly impressed transversely below the basilar space, somewhat closely punctured.

Genus Cerochroa, Gerst.

Cerochroa maculicollis.

Elongata, convexa, nitida, subtus cum antennis nigra; capite, thorace, antennarum articulo basali, scutelloque sordide flavis, ore verticisque plagâ pallide piceis; thoracis punctis quinque, 4-1 transversim positis, nigris; elytris castaneis.

Long. 6 lin.

Hab. Old Calabar.

Antennæ longer, more slender, and less compressed than in any other known species of the genus; nearly half the length of the body. Thorax narrowed and slightly rounded from base to apex; disc coarsely but subremotely punctured. Scutellum subtrigonate, distinctly punctured. Elytra somewhat closely punctured. Metasternum produced anteriorly into a strong spine, which reaches to the front edge of the anterior coxæ. Extreme apex of abdomen obscure fulvous.

Genus Lætana.

Corpus subelongatum, convexum, non metallicum. *Caput* modice exsertum, perpendiculare; *oculis* prominentibus, rotundato-ovatis, integris; *antennis* corporis longitudini fere æqualibus, ♂ robustis, ad apicem attenuatis, articulis 3-8 incrassato-dilatatis, 7-8 latitudine decrescentibus, 9-11 gracilibus, filiformibus; ♀ gracilibus, filiformibus; in utroque sexu articulis primo incrassato, secundo brevi. *Thorax* transversus, dorso impressus. *Elytra* thorace sat latiora, oblonga, postice paullo ampliata, convexa, confuse punctata. *Pedes* mediocres, robusti, simplices; *coxis* anticis erectis, contiguis; *femoribus* posticis non incrassatis; *tibiis* posticis apice spinâ validâ armatis; *unguiculis* bifidis. *Prosternum* obsoletum.

Type *Lætana histrio.*

The spine at the apex of the hinder tibiæ, the peculiar form of the antennæ in the male, together with numerous other characters, separate this genus from *Diamphidia* and other allied forms.

Lætana histrio.

Subelongata, postice paullo ampliata, convexa, pallide fulva, subnitida; oculis, antennis (harum articulis basalibus infra exceptis), pectore, pedibus, scutello, elytrisque nigris; his

crebre punctatis, margine basali plagisque tribus, duabus transversim ante medium, tertia magna pone medium, superficiem fere amplectente, positis, pallide fulvis; thorace punctis duobus fuscis notato.

Var. A. Thoracis punctis fuscis obsoletis, elytrorum plagis inter se confluentibus.

B. Elytris totis fulvis.

C. ♀ Abdomine nigro, disco obscure fulvo.

Long. 4—4½ lin.

Hab. Port Natal.

Epistome strongly raised into a longitudinal ridge between the insertion of the antennæ; between the upper portion of the eyes extends a transverse groove, from the middle of which a longitudinal grooved line runs downwards to join the apex of the epistome; on either side this medial line, and bounded above by the transverse groove, is a smooth, slightly raised, subtriangular space; vertex minutely but not closely punctured. Thorax transverse, nearly twice as broad as long; sides narrowly margined, nearly straight and parallel, slightly narrowed and rounded just behind the anterior angles; disc impressed on either side by a large deep fovea, surface finely punctured.

Genus Platyxantha.

Corpus elongatum, depressum, non metallicum, nitidum. *Caput* exsertum, subelongatum, compressum, perpendiculare; *antennis* robustis corpore brevioribus, aut filiformibus, aut apicem versus perparum incrassatis, articulis duobus ultimis (♂) dilatatis, sæpe difformibus; *oculis* modice prominentibus, integris; *mento* a basi ad apicem angustato, subconico; *ligulâ* elongatâ, 5-angulatâ; *palpis* prope apicem insertis, palporum maxillarium articulis duobus ultimis conjunctim ovatis. *Thorax* subquadratus, disco deplanato, leviter excavato, angulis anticis deflexis. *Elytra* thorace latiora, modice convexa, dorso leviter depressa, parallela, confuse punctata. *Pedes* elongati, modice robusti; *coxis* crassis, erectis, contiguis; *femoribus* non incrassatis; *tibiis* posticis apice non spinosis, intus vix ante apicem in processum validum productis; *unguiculis* acute appendiculatis. *Prosternum* obsoletum. *Mesosternum* apice subacutum, integrum. *Abdominis* apice exserto.

Type *Platyxantha apicalis.*

This genus is one of the most remarkable in the whole group of *Galleruciдæ*. The peculiar depressed form of the head and

thorax, the dilated joints at the apex of the antennæ, together with the peculiar lobe or process at the apex of the hinder tibiæ, will readily separate it at once from all other known genera. Although I possess three distinct species, all collected by Mr. Wallace, I unfortunately know apparently only the male sex.

Platyxantha apicalis.

Angustato-elongata, pallide fulva, nitida; antennarum articulis duobus ultimis, scutello, genubus, tibiis, tarsisque nigris.

Long. 4 lin.

Hab. Sumatra.

Head flattened and strongly compressed, oblong-elongate; epistome slightly thickened, triangular, truncate at the base, its surface smooth, the centre being traversed by a longitudinal ridge; on the front, just above the insertion of the antennæ, is a short perpendicular groove, which is bounded above by a transverse impressed line; at the point of junction between the two is a single fovea. Antennæ moderately robust; third and six following joints gradually decreasing in length, the ninth, tenth and eleventh joints moderately thickened, the tenth nearly equal in length to the ninth, the eleventh somewhat longer, its apex pointed; on the upper edge of each joint from the third to the ninth inclusive is a raised ridge, this is replaced on the last two joints by an elevated, ovate, cup-like space. Thorax scarcely longer than broad; sides nearly parallel, running slightly outwards from their base to beyond their middle, then curving slightly inwards to their apex; upper surface deflexed on the sides, especially in front, remotely and finely punctured; disc flattened and impressed with three large ill-defined foveæ, the first larger than the others, broadly ovate and extending from the apex to below the middle, the two others smaller but more deeply impressed, placed transversely one on either side the hinder portion of the disc, just in front of the posterior margin. Scutellum triangular, its apex rounded. Elytra not depressed below the base, finely punctured. Hinder tibiæ produced on the inner edge, just before the apex, into a slightly curved lobiform process, the apex of which is armed with a small incurved tooth.

Platyxantha nigricornis.

Elongata, parallela, rufo-picea, nitida; capite thoraceque obscure fulvis; oculis, pedibus antennisque (articulo basali excepto)

nigris; harum articulis duobus ultimis magnis, valde incrassatis, difformibus.

Long. $3\frac{1}{2}$ lin.

Hab. Java.

Head as in the last species; antennæ very robust, joints increasing in thickness from the fourth to the ninth, fourth to the eighth inclusive short, slightly compressed, subtrigonate, furnished, as in *P. apicalis*, with an acute ridge on their inner edge; ninth rather thicker, equal in length to the fourth; tenth and eleventh large, greatly thickened, nearly equal, forming conjointly more than a third of the whole length of the antenna, the inner surface of each deeply excavated, the excavations smooth and shining, the one on the tenth irregular and armed with two coarse teeth; terminal joint acute. Thorax more narrowed in front than in *P. apicalis;* surface smooth, impressed in front with a longitudinal groove, and on either side, behind the middle, with a broad transverse depression. Elytra very minutely punctured; basilar space bounded below by a curved depression. Hinder tibiæ armed on the inner edge, just before the apex, with a curved styliform process.

Platyxantha ventralis.

Elongata, modice convexa, parallela, fulva, nitida; pedibus antennisque pallidioribus; harum articulis duobus ultimis crassis, intus excavatis, concoloribus; oculis abdomineque piceo-nigris.

Long. $3\frac{1}{2}$ lin.

Hab. Mount Ophir, Singapore.

Head shorter than in either of the two preceding species; forehead less depressed, the part above the insertion of the antennæ between the upper portion of the eyes occupied by two indistinctly-raised subquadrate spaces; antennæ intermediate in size between those of *P. apicalis* and *nigricornis*, joints coarsely punctured, third to the eighth nearly equal both in length and thickness, the ninth much shorter than the eighth, tenth and eleventh much thickened, together nearly equal in length to a third part of the whole antenna, the eleventh half as long again as the tenth, its apex acute, both joints deeply excavated on their inner sides. Thorax distinctly but finely punctured; disc impressed on either side behind the middle with an oblique fovea; sides nearly straight and parallel, narrowed just behind the anterior angles. Elytra distinctly punctured; basilar space bounded beneath and laterally

by a curved depression. Hinder tibiæ armed within, just before the apex, with a slightly curved styliform process.

Genus Doridea.

Corpus anguste oblongum, convexum, non metallicum, nitidum. *Caput* exsertum, facie perpendiculari; *oculis* prominulis, integris; *antennis* ♂ robustis, articulis 9-10 valde incrassatis, difformibus; ♀ minus robustis, filiformibus; *mento* transverso-quadrato; *palporum* articulis duobus ultimis conjunctim ovatis. *Thorax* transverso-quadratus, dorso impressus. *Elytra* thorace latiora, subparallela, modice convexa, dorso subdepressa, sæpe elevato-vittata, confuse punctata. *Pedes* robusti; *coxis* anticis crassis, erectis, fere contiguis; *femoribus* posticis non incrassatis; *tibiis* posticis ♂ apice in processum acutum productis, ♀ simplicibus; *tarsorum* anticorum articulo basali ♂ valde dilatato; *unguiculis* appendiculatis. *Prosternum* fere obsoletum. *Mesosternum* apice non emarginatum.

Type *Doridea insignis.*

Doridea is very closely allied to *Platyxantha;* they both agree in having a certain number of joints dilated in the antennæ of the ♂, but in the present genus these joints are the ante-penultimate and penultimate, not the two ultimate as in the former; *Doridea* is also more robust and less depressed than *Platyxantha.*

Doridea insignis.

Subelongata, modice convexa, nitida, picea; pedibus antennisque obscure fulvis, antennarum articulis 9-10 sat dilatatis, compressis.

Long. 3½ lin.

Hab. Tringanee.

Head short, apex of epistome forming a perpendicular ridge, which passes upwards between the insertion of the antennæ; front smooth, impressed with three small foveæ, placed in a triangle on its surface, from the centre one a perpendicular groove runs downwards to join the apex of the epistome. Antennæ nearly as long as the body, robust; basal joint incrassate, curved, clavate, second short, third to the seventh cylindrical, each gradually thickened from base to apex, nearly equal in length, the third being rather longer than the others; all gradually increasing in width from the fourth to the eighth, this latter joint very short and transverse; ninth and tenth largely dilated and thickened, irregular in shape,

compressed; eleventh slender, styliform. Thorax transverse-quadrate, sides nearly straight and parallel, obliquely narrowed just behind the anterior angles; above smooth and shining, distantly punctured, impressed on either side, just behind the middle, with a large deep fovea; foveæ more closely and coarsely punctured than the remainder of the surface. Scutellum triangular, its apex obtuse. Elytra broader than the thorax, subparallel; their apex obtuse, conjointly emarginate at the sutural angle, strongly but not coarsely punctured; the surface of each elytron with about eight indistinctly raised longitudinal vittæ.

Genus Theopea.

Corpus elongatum, angustatum, parallelum, sæpe metallicum. *Caput* exsertum, declive; *antennis* sat gracilibus, corpore vix brevioribus, articulis cylindricis; ♂ subfusiformibus, articulis intermediis leviter incrassatis, cylindricis aut compressis; ♀ subfiliformibus, ad apicem non aut vix attenuatis; articulo primo leviter curvato, paullo incrassato, secundo brevi, cæteris inter se fere æqualibus, singulatim primo brevioribus; *oculis* ovatis, prominentibus, integris. *Thorax* subquadratus, dorso impressus. *Elytra* thorace paullo latiora, elongata, parallela, modice convexa, dorso subdepressa, punctato-striata, interspatiis alternis leviter costatis. *Pedes* graciles, elongati; *coxis* anticis erectis, contiguis; *femoribus* posticis non incrassatis; *tibiis* posticis apice inermibus; *tarsorum* posticorum articulo basali duobus sequentibus longiori; *unguiculis* appendiculatis. *Prosternum* fere obsoletum. *Mesosternum* apice acutum.

Type *Theopea impressa*, Fab.

Theopea pulchella.

Elongata, angustata, parallela, metallico-cærulea, nitida; antennis nigris, articulis apice albidis, articulis intermediis inter se longitudine æqualibus; thorace profunde bi-impresso; elytris costatis, interspatiis bifariam punctatis.

Mas.—Antennarum articulis intermediis modice incrassatis, cylindricis.

Fœm.—Antennis subfiliformibus, ad apicem vix attenuatis.

Long. 3 lin.

Hab. Sumatra.

This species closely resembles *T. impressa*, Fab.; in the present insect the intermediate joints of the antennæ are cylindrical and

nearly equal in length; in *impressa* they are unequal, the sixth joint being elongate, and, together with the seventh, compressed.

Theopea elegantula.

Elongata, angustata, parallela, metallico-cærulea, nitida; antennarum apice albido; thorace foveâ magnâ transversâ antice bilobatâ profunde impresso; elytris costatis, interspatiis bifariam punctatis.

Mas.—Antennarum articulis 7—9 paullo incrassatis, latitudine perparum decrescentibus, cylindricis.

Fœm.—Antennis subfiliformibus, ad apicem obsoletius attenuatis.

Long. $2\frac{2}{3}$ lin.

Hab. Sarawak.

The different form of the dorsal impression on the thorax, together with the difference in the structure of the antennæ in the male, will separate this insect from the preceding.

Theopea Mouhoti.

Elongata, angustata, parallela, subtus nigro-picea, supra sanguinea; antennis nigris; thoracis dorso utrinque profunde excavato; elytris costatis, interspatiis bifariam punctatis.

Mas.—Antennarum articulis intermediis inter se fere æqualibus, modice dilatatis, cylindricis.

Long. $3\frac{1}{2}$ lin.

Hab. Siam. Collected by the late M. Mouhot.

Genus Atysa.

Corpus elongatum, angustatum, parallelum, subopacum, non metallicum. *Caput* exsertum; *antennis* robustis, corporis longitudini æqualibus aut vix brevioribus, filiformibus, ad apicem paullo attenuatis, articulo secundo brevi; *oculis* integris, prominentibus, ovatis. *Thorax* transversus, dorso plano aut transversim concavo-excavato. *Elytra* thorace vix latiora, parallela, modice convexa, crebre punctata, pube brevissimâ adpressâ vestita. *Pedes* subelongati, modice robusti, simplices; *coxis* anticis basi transversis, crassis, erectis, subcontiguis; *femoribus* posticis non incrassatis, *tibiis* posticis muticis; *unguiculis* appendiculatis. *Prosternum* angustissimum.

Type *Atysa terminalis.*

The narrow parallel form will at once divide this genus from *Galleruca* and its allies.

Atysa terminalis.

Elongata, angustata, nigra; thorace depresso, rude crebre punctato; elytris fulvis, crebre punctatis, tertio postico nigro-purpureis.

Long. 3—4 lin.

Hab. Mysol.

Genus Alopena.

Corpus elongato-ovatum, convexum, nitidum. *Caput* extrorsum subperpendiculare; *antennis* corpore multo longioribus, gracilibus, *articulis* filiformibus, primo vix incrassato, curvato, secundo brevissimo, 3-4que utrisque articulo basali fere æqualibus, cæteris singulis paullo longioribus, 3-7 leviter curvatis; *oculis* prominentibus, integris. *Thorax* transversus, disco lævi, utrinque obsolete impresso. *Elytra* thorace paullo latiora, oblonga, subparallela, confuse punctata. *Pedes* simplices, graciles; *coxis* anticis crassis, erectis, contiguis; *femoribus* posticis non incrassatis; *tibiis* posticis apice spinâ acutâ armatis; *tarsorum* posticorum articulo basali tribus sequentibus longiori; *unguiculis* appendiculatis.

Type *Alopena collaris.*

This genus must stand close to *Luperodes*, Motsch.; it is separated by the long slender antennæ, together with the longer third joints of the latter.

Alopena collaris.

Elongata, ovata, pallide fulva, nitida; oculis, antennis elytrisque nigris; abdomine, tibiis posticis apice, tarsisque piceis.

Long. 2 lin.

Hab. New Guinea.

Antennæ more than half as long again as the body; face deeply excavated on either side between the eyes; epistome produced upwards as a longitudinal ridge between the insertion of the antennæ; above the latter is a distinct transverse groove. Thorax smooth, impressed on either side the disc by a shallow fovea. Elytra closely punctured.

Fam. CASSIDIDÆ.

Genus Calopepla, Boh.

Calopepla Livingstonii.

Elongata, subparallela, modice convexa, dorso deplanata, subtus obscure nigro-picea; pedibus nigris, prosterno abdominisque

maculis obscure fulvis; supra fulva, subnitida; antennis vertice elytrorumque margine basali nigris; thorace lateribus sinuatis, intra latera bifossulato, disco lævi utrinque foveolato et ibi fusco-maculato; elytris profunde punctato-striatis, interstitiis elevato-reticulatis, interspatiis alternis modice carinatis.

Long. 5 lin.

Hab. Zambesi. Collected by Mr. Waller.

Thorax nearly as wide at its base as the elytra, quickly narrowed from base to apex; sides nearly straight, sinuate in their middle; apical margin truncate, anterior angles scarcely produced, obtuse.

The discovery of a species of the (hitherto considered) exclusively Indian genus *Calopepla*, in the southern portion of tropical Africa, is highly interesting, and, like the similar occurrence of *Sagra*, *Hoplionota*, *Aspidomorpha*, and other genera common to the two countries, would seem to point to a former more intimate connexion between these two quarters of the globe, rendering it probable that in some former geological epoch a large connecting tract of now-submerged land existed in the Indian Ocean. In accordance with this view, the few known species of the genus (only four in number) found in such widely-distant localities, and agreeing so completely in generic characters, may be looked upon as the remnants of a much more numerous race, which formerly flourished in greater abundance on the now lost intermediate continent.

An analogous case in the same family is to be found in the nearly allied genus *Hoplionota*, the species of which, according to Boheman, are exclusively confined, on the one hand, to Madagascar and southern Africa, on the other to India and the Malay Archipelago. Madagascar and Ceylon (both of which islands are probably remnants of the now lost land) contain more than two-thirds of the known species, the others (four in Africa and five or six in India and the Malay Archipelago) spreading in either case in a southerly direction on their respective continents. The occurrence of so large a proportion of the species in Madagascar and Ceylon would seem to show that the birthplace or metropolis of the genus formerly existed at some intermediate point, and that the species now living have spread themselves on either side from this common centre.

It may however be argued that these various genera have migrated over both continents through Egypt, Arabia and Persia; the alteration of climate, the spread of sandy deserts, and other causes, having given rise to the gradual or sudden extinction of

species formerly living in great abundance in those portions of the globe: indeed, several species of *Sagra* are still existing in Abyssinia and northern India. But I think it may be shown that these species originally migrated northwards from the southern tropics, and not southwards from more northerly latitudes. The African and Asiatic species of *Sagra* present two well-marked types; the species found in either continent bearing those peculiar characters which belong to their congeners of that quarter of the world to which they geographically belong. Now had the genus originally spread itself southwards from the northern tropics across the equator, the species inhabiting Abyssinia and northern India ought surely to present more points of similarity than those of the more southern latitudes, as being nearer the common source from which the genus originally sprang; this, however, is not borne out by facts, the species inhabiting those countries being as distinct from each other, and bearing respectively the characters of the African or Asiatic types as strongly developed, as those found in Madagascar, India or Java.

Genus Dolichotoma, Hope.

Dolichotoma Salvinii.

Rotundata, ♂ subtriangularis, ♀ convexa, obscure ænea, subnitida; elytris rude et profunde punctatis, elevato-reticulatis, antice retusis, modice transversim gibbosis, disci maculis plurimis margineque explanato-sanguineis, hoc sat dilatato, æneo-limbato, disco maculis irregularibus æneis notato.

Var. A.—Elytris sanguineis, sutura, limbo exteriori, maculis rugulisque disci æneis.

B.—Elytris disco toto æneo.

Long. 7 lin.

Hab. Panama. Collected by Mr. Salvin.

Antennæ ♂ longer than half the body. Thorax twice as broad as long, sides oblique, base deeply bisinuate on either side, medial lobe emarginate at its apex; surface opaque, centre of disc impressed with a longitudinal groove, which terminates anteriorly in a narrowed ridge; this last is continued onwards to the apical margin. Elytra much wider than the thorax, their lateral border broadly dilated; shoulders regularly rounded in the ♂, obliquely rounded in the ♀; sides rounded, gradually narrowed from their middle towards the apex, the latter obtuse; dilated margin smooth, opaque, impunctate.

Genus Mesomphalia, Hope.

Mesomphalia Salvinii.

Subrotundata, modice convexa, viridi-metallica, subnitida, subtus nitida; thorace subtilissime punctato, lateribus a basi ad apicem rotundato-angustatis, margine antico fulvo; elytris dorso antico minus profunde—pone medium margineque subtilissime—punctatis, utrisque plagâ transversâ magnâ, antice emarginatâ, postice sinuatâ, fulvâ, æneo-trinotatâ.

Long. 5—6 lin.

Hab. Panama.

Extremely close to *M. discoides*, but at once to be distinguished from that insect by its much finer punctation; the elytra are also broader, their shoulders being more regularly rounded. Antennæ equal in length to the thorax, black, four or five basal joints fulvous beneath. Thorax opaque, obsoletely punctured; sides less dilated than in *M. discoides*, being regularly narrowed and rounded from base to apex. Elytra ♂ much broader than the thorax; sides broadly dilated, obliquely rotundate-ampliate at the shoulders, thence rotundate-angustate to the apex, the latter conjointly subangulate; the fulvous patch on each elytron is placed transversely across the middle of the disc, extending from just within the lateral border nearly to the suture; its surface is marked with three small æneous spots, placed triangularly on its middle.

Genus Batonota, Boh.

Batonota Godmanii.

Subtriangularis, convexa, obscure fulvo-fusca aut picea, subnitida; antennis (basi exceptâ) nigris; elytris viridibus, basi retusis, ante medium alte transversim gibbosis, confuse, prope suturam seriatim punctatis, disco laxe elevato-reticulatis, ad suturam bicarinatis; humeris antrorsum vix productis, acute angulatis, dorso carinâ obliquâ instructis; margine late explanato, fulvo, æneo-punctato, limbo toto æneo.

Long. 6 lin.

Hab. Panama.

Nearly allied to *B. bivittipennis*, Boh., to which species it bears the most striking resemblance in general form, sculpture and pattern of coloration; it may, however, be distinguished by the colour of the body, and still more easily by the form of the

gibbosity of the elytra, this part being much produced in the present species, and forming a short flattened spine; in *bivittipennis*, on the other hand, it is very short, and approaches more nearly to *B. peregrina* and other allied species.

Thorax twice as broad as long; sides obliquely dilated, very slightly rounded; surface opaque, obsoletely punctured, impressed along the base with four or five large foveæ; anterior half of the disc deeply excavated, leaving the medial line as a distinct longitudinal ridge. Scutellum smooth, impressed in the middle with a large deep fovea.

IX. *Descriptions of New Species of Diurnal* Lepidoptera.

By W. C. Hewitson, F.L.S.

[Read August 1st and September 5th, 1864.]

1. *Helcyra Hemina.* (Pl. XV. fig. 1.)

Male.—Upperside white. Anterior wing with the apex broadly black, marked with two white spots; two black spots at the end of the cell, and one near the anal angle of the same colour. Posterior wing with seven spots beyond the middle, a submarginal line, and the outer margin (which is very narrow) black.

Underside lilac-white. Anterior wing spotless, with two indistinct lines of brown near the middle, and one scarcely seen near the anal angle. Posterior wing with the spots of the upperside and the submarginal line indistinctly marked in lilac, preceded by arches of rufous-brown; the black spot (the outer spot of three near the anal angle) crowned with bright yellow.

Exp. $2\frac{7}{10}$ inch.

Hab. India.

In the Collection of the British Museum.

This adds a second species to Dr. Felder's genus *Helcyra*, which he considers nearest to *Apatura*. It differs from the neighbouring genera in the rounded club of the antennæ, which resembles *Argynnis* and *Callithea*. It has the cells of both wings open. In the museum at Leyden this species is put with *Charaxes*, to which it bears a general resemblance. Specimens are in the collection of Mr. Atkinson, of Calcutta, and Mr. Moore has shown me one from the Dublin Museum.

2. *Limenitis Labotas.* (Pl. XV. fig. 2.)

Female.—Upperside dark brown. Both wings crossed obliquely at the middle by a common, straight, narrow, white band, broken into spots at its commencement on the anterior wing, followed between it and the outer margin by a band of black spots. Anterior wing with two crimson spots bordered with black, and a minute white spot within the cell; an indistinct white spot a little beyond the middle of the costal margin.

Underside as above, except that it is altogether of a pale grey-

green, and that the black spots beyond the central band are much less distinct, some of them being nearly or entirely effaced.

Exp. $3\frac{1}{2}$ inch.

Hab. Menado.

In the Collection of W. C. Hewitson.

3. *Limenitis Ligyes.* (Pl. XV. figs. 3, 4.)

Female.—Upperside dark brown. Both wings crossed by a nearly central band of white spots, followed between it and the outer margin by two bands of lunular black spots. Anterior wing with a black band, a rufous spot and a white band within the cell, and a rufous band at the end of the cell; three white spots near the apex. Posterior wing with rufous spots between the two submarginal bands of black spots.

Underside ochreous-yellow. Anterior wing with the basal half rufous, the central band as above, the lower spots bordered with black; a lunular white spot below the cell. Posterior wing (the central band excepted) immaculate.

Exp. $2\frac{1}{2}$ inch.

Hab. North India.

In the Collection of W. C. Hewitson.

4. *Laogona Lilæa.* (Pl. XV. figs. 5, 6.)

Male.—Upperside dark brown. Anterior wing with a band from the base to beyond the middle, a minute spot at the apex, two spots below it (one nearly bipartite), a lunular spot (near the end of the first band), and a bifid band between it and the inner margin, all rufous-orange. Posterior wing with a spot before the middle and two spots on the ventral fold rufous.

Underside ochreous-yellow, clouded with rufous-brown. Both wings crossed beyond the middle by a common rufous band. Posterior wing crossed near the base by a band of brown; tinted with lilac from the middle to the anal angle.

Exp. $1\frac{8}{10}$ inch.

Hab. East India.

In the Collection of W. C. Hewitson.

5. *Gonepteryx Gobrias.* (Pl. XVI. fig. 1.)

Male.—Upperside bright yellow. Anterior wing with a large square apical black spot; the outer margin with triangular black spots; a spot at the end of the cell and a transverse band beyond

the middle (commencing at the black apical spot) orange. Posterior wing with a narrow margin of black, the fringe carmine.

Underside pale yellow, the apical spot of the anterior wing rufous, tinted with lilac; the base of the costal margin carmine; the spot at the end of the cell more distinct: the transverse band more distinct, continued half across the posterior wing.

Female.—Nearly white.

Exp. $2\frac{7}{10}$ inch.

Hab. Borneo.

In the Collection of W. C. Hewitson.

Very closely allied to *G. Verhuellii*, from which it differs in wanting the acuminated apex of the anterior wing, and having the outer margin of the posterior wing black. *G. Licorias* of Doubleday does not differ from *G. Verhuellii*.

6. *Eteona Eupolis*. (Pl. XVI. fig. 2.)

Upperside dark brown. Anterior wing with a large spot within the cell, a second spot from the base parallel to the costal margin, and a third spot between two of the median nervules, rufous-orange; a transverse band beyond the middle, with a minute spot beyond and near it, yellow. Posterior wing from the base to the middle rufous-yellow, rufous beyond the middle; the nervures and a broad outer margin dark brown.

Underside. Anterior wing as above, except that the apex is rufous, striated with black. Posterior wing rufous, with some pale yellow oblong spots near the costal margin; striated throughout longitudinally with dark brown, and between these striæ towards the outer margin by lines of lilac-white.

Exp. $2\frac{1}{2}$ inch.

Hab. Rio Janeiro.

In the Collection of W. C. Hewitson.

One species only of this genus has been hitherto described. It was originally placed by Boisduval with the *Pieridæ* in the genus *Euterpe;* Mr. Westwood ranged it with the *Nymphalidæ*, next before *Epicalia;* and Dr. Felder has subsequently removed it to the *Satyridæ*, near to *Pronophila*, with which genus it possesses many characters in common, having the inflated costal nervure of the *Satyridæ*.

This species is in the Museum at Vienna accompanied by a MS. name of Kollar's, but I am sorry to say that I do not remember it.

7. *Eueides Eurysaces.* (Pl. XVI. fig. 3.)

Female.—Upperside dark brown. Anterior wing with two transverse bands and a large trifid spot of transparent grey-white, (except near the base, which is yellow); a submarginal band of white spots most distinctly marked near the apex. Posterior wing with a broad, central, semi-transparent, transverse band of yellow (near the base) and grey; the nervures black: a white spot at the apex and a submarginal band of very indistinct white spots.

Underside as above, except that it is paler and that the submarginal white spots are more distinct and in pairs.

Exp. $2\frac{6}{10}$ inch.

Hab. Quito.

In the Collection of W. C. Hewitson.

Differs from all the other species of this genus by its transparent wings.

8. *Dircenna Dercyllidas.* (Pl. XVI. fig. 4.)

Female.—Upperside dark brown. Anterior wing crossed by three bands of transparent white: the first bifid, commencing at the base and ending near the anal angle; the second beyond the middle hexafid; the third near the apex of two spots, the upper spot trifid. Posterior wing with the basal half, a small spot at the apex, and a submarginal macular band, transparent white.

Underside as above, except that the dark brown of the upperside is rufous, that the anterior wing has some indistinct grey spots near the apex and between the first and second transverse bands, and that the posterior wing has the base of the costal margin and three oblong spots, near it beyond its middle, grey.

Exp. $2\frac{9}{10}$ inch.

Hab. New Granada.

In the Collection of W. C. Hewitson.

Very interesting from its general resemblance to *Cœlenis Dido.*

9. *Lasiommata Lasus.* (Pl. XVI. fig. 5.)

Male.—Upperside dark brown. Anterior wing with three short equidistant bands and a large trifid spot of pale rufous-yellow; beyond these three black eye-like spots dotted with white and an indistinct submarginal rufous band. Posterior wing with a large spot near the costal margin, a large spot towards the anal angle marked by a black ocellus, and two small spots near the outer margin, all rufous.

Underside as above, except that it is paler, that the posterior

wing is undulated throughout with rufous-brown, and that it has two or three very minute eye-like spots, the ocellus of the upper-side being scarcely visible.

Exp. 1½ inch.

Hab. Australia, particular locality unknown.

In the Collection of W. C. Hewitson.

Near *L. Lathoniella* of Westwood.

10. *Lasiommata Leprea.* (Pl. XVI. figs. 6, 7.)

Male.—Upperside dark brown. Anterior wing with the basal half yellow, irrorated at the base with brown, marked in the cell by a black spot, crossed beyond the middle by a band of yellow. Posterior wing crossed at the middle by a curved band of yellow; the margins of both wings spotted with white.

Underside. Both wings with the outer margins pale yellow with black spots, and above them conical spots of silvery white. Anterior wing as above (except the outer margin as just described). Posterior wing with the basal half silvery white: the base itself dark brown, followed before the middle by two spots and an angular curved band of dark brown, and beyond the middle by six blind black ocelli bordered with yellow.

Exp. 1½ inch.

Hab. Australia, particular locality unknown.

In the Collection of W. C. Hewitson.

X. *Further Descriptions of new Genera and Species of* Phytophaga. By J. S. Baly.

[Read 3rd October, 1864.]

Fam. HISPIDÆ.

Genus Charistena.

Corpus elongatum, angustatum, sæpe filiforme, parallelum, subcylindricum. *Caput* inter oculos non productum, obtusum; *antennis* subfiliformibus, inter partem inferiorem oculorum insertis, 11-articulatis, articulis distinctis, quinque ultimis clavam gracilem sed distinctam formantibus; *epistomate* brevi, basi elevatâ. *Thorax* subcylindricus, lateribus subrectis aut leviter rotundatis. *Scutellum* truncatum. *Elytra* thorace paullo latiora, elongata aut subelongata, lateribus rectis, parallelis, rarius minute serratis, apice rotundatis, semper serratis, angulis posticis obsoletis; supra convexa aut subcylindrica, utraque tricostata, interspatiis profunde bifariam punctatis. *Pedes* mediocres, modice robusti; *tibiis* intermediis curvatis, apice in dentem brevem acutum introrsum productis; *tarsorum* articulo basali duobus sequentibus angustiori; *unguiculis* contiguis.

Type *Charistena ruficollis*, Fab.

This genus is nearly allied to *Odontota;* its slender form, blunt head, distinct joints of antennæ, and curved intermediate tibiæ, are characters which taken conjointly will easily separate it from that genus.

Sp. 1. *Charistena ruficollis*, Fabr.

Syst. El. ii. 63; Oliv. Entom. vi. 778, pl. ii. fig. 34.

Hab. Cayenne; Bahia.

Var. A. Elytris utrisque lineâ longitudinali, postice abbreviatâ, fulvâ.

Collections of Rev. H. Clark, A. Fry, W. W. Saunders, and my own cabinet.

This species is nearest, both in coloration and form, to *Ch. Ariadne*. In the present insect the base of the thorax is concolorous with the disc, the general surface is also more coarsely punctured; the elytra are less cylindrical, being somewhat flattened above, and their costæ more distinctly elevated; their apical margin is also more distinctly serrate. The much smaller size

and entirely different colour will distinguish it from *Ch. basalis*, its narrower form from *Ch. Lecontii*, the different colour and form of thorax from *Ch. nigrita*, and its much narrower and more elongated shape from *Ch. Pilatei* and all the other species in the present paper.

Sp. 2. *Charistena nigrita*, Oliv.
Entom. vi. 778, pl. ii. fig. 35.

Hab. Carolina.

In my own Collection and that of the Rev. H. Clark, to whom I am indebted for a specimen.

Thorax distinctly longer than broad, sides slightly rounded, narrowed in front; surface very closely covered with large deep punctures, almost rugose; base of thorax indistinctly depressed transversely, but without any trace of sulcation; apex of elytra minutely serrate.

The entirely black colour, together with the shape of the thorax, at once separates this insect from its congeners.

Sp. 3. *Charistena Ariadne*, Newm.
The Entom. i. 77.

"Nigra, prothorace tantum rubro: prothorax profunde punctus; utrumque elytron 3-carinatum, marginibus quoque elevatis; interspatiis seriebus 2 punctorum profundorum impressis. Insectum longum (corp. long. ·175 unc., lat. ·05 unc.)"

Hab. United States of North America.

Mr. Newman has omitted to mention the black apical and basal margins of the thorax, which are very marked in the present species. I venture to correct his description, having one of his typical specimens in my own possession. I have reproduced his description entire from the "Entomologist," the latter being a book seldom to be met with.

As stated under *Ch. ruficollis*, the more cylindrical body and coarsely punctured thorax will distinguish *Ch. Ariadne* from its allies.

Collections of British Museum, Rev. H. Clark, and my own.

Sp. 4. *Charistena Lecontii*.

Elongata, tenuis, angustata, subcylindrica, dorso subdepressa, nigra, nitida; thorace transverso, lateribus rotundatis, ad apicem vix angustatis, dorso crebre profunde punctato, basi

transversim sulcato, disci medio vittâ elevatâ instructo, rufo-fulvo, apice basique medio nigris; elytris apice minute serratis, lateribus minus rectis.

Long. $2\frac{1}{2}$ lin.

Hab. North America.

Its larger size, broader and less cylindrical form, together with the transverse thorax, will distinguish this species from *Ch. Ariadne*, the other North American species with which it may be confounded; the two strongly resemble each other in colour.

Collection of Rev. H. Clark, and my own.

Sp. 5. *Charistena basalis.*

Elongata, filiformis, subcylindrica, nigra, nitida; thorace convexo, fulvo, basi transversim impresso, crebre profunde punctato, vittâ centrali obsolete elevatâ, impunctatâ; elytris elongatis, parallelis, apice distincte serratis, cyaneis, utrisque plagâ basali parvâ fulvâ.

Long. $3\frac{1}{4}$ lin.

Hab. Amazons. Collected by Mr. H. W. Bates.

Entirely similar in form to *Ch. ruficollis*, quite three times its size, its thorax rather longer and more convex; the apex of the elytra is however subacutely rounded.

Collection of H. W. Bates, also in my own cabinet.

Sp. 6. *Charistena Deyrollei.*

Elongata, subcylindrica, dorso subdepressa, nigra, nitida; elytris nigro-cæruleis; thorace, femorum anticorum basi, elytrorumque vittâ latâ laterali, vix pone medium abbreviatâ, pallide fulvis; thorace sat convexo, basi transversim depresso, profunde punctato.

Long. $2\frac{1}{3}$ lin.

Hab. Upper Amazons, Columbia.

Elytra parallel, their apex finely but irregularly toothed.

I have named this pretty species after my friend M. H. Deyrolle of Paris, who is making a special study of the *Phytophaga*.

Collections of H. Deyrolle, H. W. Bates, A. Fry, and my own cabinet.

Sp. 7. *Charistena bellula.*

Minus elongata, minus parallela, nigra, nitida; facie inferiori femorumque basi obscure fulvis; thorace vix transverso, læte rufo-fulvo, profunde sed subremote punctato, convexo,

basi transversim depresso; elytris cyaneis, dorso depressis, apice minute serratis.

Long. $1\frac{2}{3}$—2 lin.

Hab. Bogota.

Much shorter and proportionately broader than *Ch. ruficollis*, sides of elytra less straight than in that species; thorax as deeply but less closely punctured on the sides, depression at the base less deeply marked.

Collections of H. Deyrolle, Rev. H. Clark, and my own.

Sp. 8. *Charistena elegantula.*

Minus elongata, angustata, subcylindrica, dorso subdepressa, rufo-fulva, nitida; corpore infra pedibusque nigro-variegatis; oculis antennisque nigris; thorace latitudine vix longiori, lateribus fere rectis, ad apicem leniter angustatis; dorso subcylindrico, profunde subremote punctato, spatio longitudinali centrali impunctato, basi transversim sulcata; elytris nigro-cyaneis, apice minute serratis, utrisque puncto apicali, prope suturam posito, fulvo.

Long. $1\frac{4}{5}$ lin.

Hab. New Granada.

The different form of thorax, together with the different coloration, will separate this lovely species from *Ch. bellula.*

Cabinet of Rev. H. Clark, also in my own Collection.

Sp. 9. *Charistena Pilatei.*

Minus elongata, parallela, subcylindrica, nigra, nitida; thorace fulvo, apice piceo-marginato, dorso subgloboso, basi transversim sulcato, lateribus subremote disco remote punctato; elytris cyaneis, parallelis, apice minute serratis, utrisque vittâ fulvâ a basi apicem versus plus minusve extensâ, instructis.

Long. 2 lin.

Hab. Teapa. Collected by the late M. Pilate.

Rather longer, stouter and more parallel than *Ch. bellula*, to which species it is most nearly allied. Elytra parallel, their apex broadly rounded. The fulvous stripe on each elytron varies greatly in length, and occasionally is nearly obsolete; the piceous apical border of the thorax is also sometimes very much narrowed and indistinct.

In the cabinet of the Rev. H. Clark, also in my own Collection.

Sp. 10. *Charistena trilineata.*

Subelongata, angustata, subcylindrica, dorso subdepressa, rufofulva, nitida; antennis (basi exceptâ) scutelloque nigris; elytrorum vittâ suturali, alterâque laterali, hac ante apicem abbreviatâ, obscure cyaneis; vertice, thoracis lateribus anguste, tibiarum apice tarsisque piceis; thorace rude punctato, basi non transversim depresso, disci medio obsolete longitudinaliter sulcato.

Long. $1\frac{2}{3}$ lin.

Hab. Yucatan.

Thorax transversely convex, its sides parallel, slightly rounded; elytra depressed along the suture, lateral and apical edges minutely but not closely serrate; apex of abdomen obscure fuscous.

The more depressed form both of thorax and elytra will serve to separate this species from *Ch. Pilatei.*

Collection of Rev. H. Clark, and my own.

Genus Metaxycera.

Corpus obcuneiforme, dorso depressum. *Caput* inter oculos vix productum; *antennis* 11-articulatis, rigidis, subfusiformibus, apice acutis, modice robustis, corporis dimidio brevioribus, articulis cylindricis, duobus basalibus brevibus, primo paullo incrassato, tertio modice elongato; *oculis* vix prominulis; *mento* oblongo, lateribus medio sinuatis. *Thorax* transversus; lateribus pone medium fere rectis, antice angustatis, sinuatis; angulo antico acuto, sæpe dente parvo armato; dorso modice transversim convexo; basi transversim depressa. *Scutellum* truncatum. *Elytra* thorace latiora, a basi ad apicem ampliata; apice obtuso aut rotundato, angulis posticis obtusis aut rotundatis; anguste marginata, margine serrato; dorso depressa, utraque quadricostata, costa tertia minus distincta, interspatiis profunde bifariam punctatis. *Pedes* mediocres, modice robusti; *tarsorum* articulo basali parvo; *unguiculis* contiguis. *Abdomen* suturâ inter segmenta duo basalia ventris distinctâ.

Type *Metaxycera purpurata*, Guér.

This genus is (like the last) nearly allied to *Odontota;* but although much more different in habit, it is more difficult to find good differential characters. It may, however, be separated by the slight prominence of the head in front, by the subfusiform cylindrical 11-jointed antennæ, and the distinct sutural line be-

tween the two basal segments of the ventral surface of the abdomen; this line is usually obsolete or only indistinct in *Odontota*.

Sp. 1. *Metaxycera purpurata*, Guér.

Icon. du Règne Animal, Texte, p. 270.

Hab. Brazil.

This beautiful species is the most common of the genus, and found in most collections; it is broader than any of the others, with the exception of *M. rubroguttata*, which insect approaches it very closely in form, but is less flattened above.

Sp. 2. *Metaxycera rubroguttata*.

Obcuneiformis, dorso depressa, late rufo-testacea, subnitida; vertice postice, thoracisque plaga magna discoidali nigro-piceis; antennis elytrisque nigris, his a basi ad apicem perparum ampliatis, apice rotundatis, utrisque margine humerali pustulisque quinque, harum tribus prope suturam, prima infra basim, secunda prope medium, tertiaque apicem versus, duabusque intra marginem exteriorem, prima infra humerum, secunda prope angulum posticum positis, rufo-testaceis.

Long. 5 lin.

Hab. Amazons.

The four hinder spots on each elytron are confluent in pairs, and form two oblique fasciæ on the disc; thorax transverse, sides nearly straight and parallel behind, obliquely narrowed in front; upper surface irregularly excavated, opaque, irregularly but not closely punctured, middle of disc with an indistinct longitudinal groove; scutellum black, its apex rufous.

This species closely resembles in form *M. purpurata*, Guér.; it is, however, less depressed, less coarsely punctured, more regularly rounded both at the hinder angles and apex, and the arrangement of the spots on the elytra is different.

Unique in my own Collection.

Sp. 3. *Metaxycera trimaculata*, Oliv.

(*Hispa*), Entom. vi. 761, pl. i. fig. 5.

Hab. Cayenne.

Olivier describes this species as having a black scutellum; it varies, however, greatly in this respect, some specimens having the scutellum more or less stained with rufous, others entirely red.

Collection of Rev. H. Clark, and my own.

Sp. 4. *Metaxycera Amazona.*

Anguste obcuneiformis, dorso depressa, rufo-testacea, nitida, supra subnitida; antennis, vertice, thoracisque lateribus nigris; elytris obscure nigro-æneis, apice obtusis, utrisque vitta lata discoidali, a basi ad paullo pone medium extensa, plerumque apice extrorsum ampliata, fasciaque lata pone medium, extrorsum abbreviata, postice recte truncata aut concava, antice convexa, rufo-testaceis.

Var. A. Vertice thoracisque lateribus rufis; elytris nigris, ut in typo maculatis.

Long. 4 lin.

Hab. Amazons. Collected by Mr. H. W. Bates.

Sides of thorax straight and parallel behind the middle, obliquely converging from the middle to the apex, and forming an obtuse angle with the hinder half; surface coarsely punctured, punctures crowded on the sides, more distant on the disc, the latter impressed with a broad longitudinal groove, which terminates behind at a transverse depression in front of the basal margin.

This species is very closely allied to *M. trimaculata*, Oliv. It may be, however, distinguished from that insect by the following characters: in *M. Amazona* the thorax is broader and more distinctly angled on the sides, the longitudinal groove on its upper surface being broader and very deeply impressed; the scutellum is always red; the elytra are rather less coarsely punctured and more opaque, the costæ being also somewhat narrower; the transverse rufous patch is placed at a greater distance from the apex of the elytra, is broader, and has its front edge strongly rounded, its hinder border being either truncate or slightly concave. In *M. trimaculata* the antennæ are rather more robust; the thorax is narrower (in some specimens almost conic), less distinctly angled on the sides, the upper surface less flattened, the longitudinal groove, although visible, being also much narrower and less deeply impressed; the scutellum is usually black, rarely wholly or in part rufous; the elytra are more coarsely punctured, the costæ being broader and more nitidous; the longitudinal rufous vitta is narrower, its hinder half not dilated towards the outer margin; it is also usually interrupted in the middle to form two linear patches; the subapical transverse patch is narrow, and placed much nearer the apex of the elytra, its anterior border, instead of being rounded, is nearly straight and bisinuate, and its hinder margin is either straight or very slightly convex.

Collection of Mr. Bates, and my own.

Sp. 5. *Metaxycera sexpustulata.*

Anguste obcuneiformis, dorso depressa, rufo-testacea, nitida, supra subnitida; antennis elytrisque nigris, his subparallelis, apicem versus leniter ampliatis, apice rotundatis, utrisque pustulis tribus, unâ basali oblongâ obliquâ, secundâ prope medium subquadratâ, tertiâque ante apicem, transversâ, communi, fasciam transversam postice bisemarginatam formante, rufo-testaceis; unguiculis piceis.

Long. $3\frac{1}{2}$—$4\frac{1}{2}$ lin.

Hab. Upper Amazons.

Thorax opaque, irregularly depressed and excavated, middle of disc with an indistinct longitudinal groove, transverse impression in front of base well marked, surface coarsely but not very closely punctured, sides of thorax nearly straight and produced obliquely outwards behind the middle, thence obliquely narrowed to the apex.

The rounded apex of the elytra separates this species from *M. trimaculata* and *Amazona*, the only insects with which it can be confounded.

Collection of Mr. Bates, and my own.

XI. *Notes on the Genus* Schematiza (Phytophaga, Galleruciдæ), *with Descriptions of New Species.* By the Rev. Hamlet Clark, M.A., F.L.S., V.-P. Ent. Soc.

[Read September 5th, 1864.]

The South American genus *Schematiza* contains within it species that vary considerably among each other in form and sculpture. Some (and these the most striking in size and beauty) have deeply costate elytra; others have their elytra perfectly plain: some are broadly dilated towards their apex; others have the sides of their elytra parallel. The species are for the most part coloured with irregular flavous bands, and may be at once separated from other *Gallerucidæ* by their sufficiently short and broadly dilated antennæ: this dilatation is not irregular or confined to one or two articulations, but gradually progressive from the first and also from the apical joints towards the middle. In form the species are more or less elongate and depressed; not subcylindrical, as in *Adimonia* and *Galleruca*. The following diagnosis will suffice to point out the limits of the genus.

Schematiza (Chev.)

Corporis forma vel oblongo-ovalis (versus apicem plus minus dilatata), vel parallela; depressa, pube tenuissimâ satis vestita. *Palpi maxillares* articulo ultimo dilatato, et ad apicem acuminato, plerumque ut in genere *Adimonia*. *Antennæ* robustæ; in quibusdam speciebus versus apicem subproductæ, sed semper ad medium dilatatæ; hac dilatatione ab articulo basali etiamque ab 11mo vel 10mo sensim et paulatim auctâ; articuli compressi aliquando, et aliquando subcylindrici; art. 3^{tius} longitudine primum (ad apicem dilatatum) superat. *Caput* penitus verticale, vix porrectum. *Thorax* transversus, depressus, plerumque marginibus subelevatis, ita ut discus totus excavatus videtur. *Elytra* plerumque costata (costis latis etiamque profundis, sed haud apicem attingentibus), aliquando autem plana et sublævigata. *Pedes* robusti, *unguiculi* vel appendiculati (ut in *S. Lycoides*) vel undique bifidi, ita ut quadri-unguiculatæ species apparent (ut in *S. Hispiformi*, et presertim in *S. flavofasciatâ*).

§ A. Species elytris apice rotundatis.
a. Elytris costatis. [Sp. 1—10.]
b. Elytris planis. [Sp. 11—14.]
§ B. Species elytris apice emarginatis. [Sp. 15, 16.]

In order that I might be supplied with as much material as possible in my examination of the genus, my friend Mr. Baly has liberally placed in my hands the whole of the species in his collection. I have not, however, accepted his kind suggestion that I should describe the uniques which that collection contains; it is better that these should be left to be described by himself at some future day, for this simple reason, which I deem to be not only important but of general application:—such is the multiplication of species that are becoming known to us, and such therefore the difficulty of accurately describing them, that *typical specimens*, on which descriptions are based, become of greater importance than ever; and hence I venture to believe that every worker will specially desire to have always within his reach the materials on which his own work has been based; in the case of monographs this difficulty must of course be accepted as unavoidable; it seems, however, to my mind that it is better to avoid it when possible.

It will be seen that I have omitted to notice certain manuscript names in Dejean's Catalogue: I have done so with regret, but I can ascertain nothing with certainty respecting them.

§ A. Species elytris apice rotundatis.
a. Elytris costatis.

1. *S. Lycoides*, Guér. (Cuv. *Règne Anim. Ins.* p. 303.)

Oblongo-ovalis, ad apicem rotundata, depressa, costata, subtiliter et crebre variolata, flava, nigro-notata: *caput* variolatum, nigrum; *thorax* transversus (ad apicem modice excavatus, lateribus antice rotundatis et basi transversâ) depressus, et ad margines latè sed haud profunde exfossus; quoad colorem latera latè flava sunt, discus medius nigrescit; *scutellum* triangulare, nigrum; *elytra* modice post medium ampliora costas quinque continent, una suturalis et communis, altera marginalis, tres quoque intervallo æquali mediæ haud apicem attinent; costæ exstantes, sed præcipue sublateralis prominens versus humeros exstat; quoad colorem elytra flava sunt, vittâ abbreviatâ apud scutellum et apice latè nigris; vitta abbreviata inter suturam et costam 2^{dam} longitudine elytri dimidium haud æquat; apex quoque quoad partem

tertiam elytrorum nigrescit ; *antennæ* satis elongatæ et latæ, nigræ ; ita quoque *pedes* et *corpus* inferius.

Long. corp. lin. 6—5½ ; lat. lin. 3—2¾.

It is probable that *S. Lycoides* is subject to some variation of pattern in the anterior part of the elytra : in one of the examples before me there is a trace of dark colouring between the 2nd and 3rd costæ, and also again near the margination; even, however, should the anterior part be in any examples entirely dark, the difference of the form of the elytra, which are more parallel, or rather less broadly rounded behind the middle, will abundantly separate this from the following species.

In the Collections of Mr. Baly and the Rev. H. Clark. The insect is taken in Brazil.

2. *S. amplicornis*, n. sp.

Lata, undique quinque-costata, subtiliter granulata, nigra, fasciâ flavâ mediâ : *caput* subtiliter granulatum, nigrum ; *thorax* depressus, latè transversus, antice modice excavatus, ad latera rotundatus, et apicem versus contractus; margo basalis transversus est; apud latera thorax longitudinaliter latè et haud profundè excavatur, hæc fovea undique flava est, disco medio corrugato et nigro ; *scutellum* triangulare est, colore nigrum; *elytra* versus medium rotundato-ampliata, ad apicem rotundata (vix dehiscentia), depressa et apud apicem declivia, ad humeros thorace paululum latiora, gradatim ad post medium ampliantur ; in utroque elytro costæ quinque apparent, una communis suturalis, una marginalis, tresque aliæ mediæ intervallis æquis, his haud apicem attingentibus, sed costis 2 et 3 juxta apicem sese attingentibus ; marginatio undique ad apicem latè ampliatur ; quoad faciem elytra leviter et sæpissime punctis confertis ornantur (punctis haud profundis et inordinatis), quoad colorem nigrescunt, humeris anguste flavis, fasciâque mediâ latâ transversâ flavâ ; hujus fasciæ margines anterior et posterior inæquales in intervallis singulis costarum subcirculares deflectuntur; *antennæ* robustæ sunt et nigræ, articulis ad medium antennarum valde ampliatis ; *pedes* et *corpus* infra nigrescunt.

Long. corp. lin. 6 ; lat. lin. 3½.

S. amplicornis differs from *S. Lycoides* in being broader and less parallel as well as different in coloration ; its much larger size will distinguish it from all other species of the genus before me. I have a single specimen from the Chevrolat Collection, received by M. Chevrolat from Brazil.

3. S. vicina, n. sp.

Oblongo-ovalis, apice rotundata, elytris paulum dehiscentibus, flava, nigro-maculata: *caput* nigrum; *thorax* transversus, lateribus rotundatis sed haud ad apicem coarctis, margine antico paulum excavato, basi transversa, angulis posticis subrotundatis, sculptura ut in speciebus præcedentibus; *scutellum* subcordatum, nigrum; *elytra* ad humeros thorace sublatiora, et deinde gradatim ampliora; a basi ad apicis regionem sunt sulci quatuor profundi lati, interstitiis rotundatis; horum externus profundissimus est post humeros, suturalis et 2ndus æquales, paralleli, tertius (minor subobsoletus) inter 2um et marginalem vix apparet; quoad colorem, elytra flava (pube densâ et tenui flavâ vestita), vittâ abbreviatâ ad suturam et basi latè nigris; vitta abbreviata a sutura usque ad sulcum primum minus quam elytrorum dimidium occupat; apex quoque latè niger est; *antennæ* incrassatæ, nigræ; *pedes corpus*que subtus quoque nigri.

Long. corp. lin. $4\frac{1}{2}$; lat. lin. 2.

S. vicina differs entirely from the preceding species by the sculpture of the elytra, although the mere patterns are in some degree similar; instead of sharply defined and narrow ridges we have here rather longitudinal depressions, the intervals being rounded off; the flavous coloration of the insect is formed by very close and fine pubescence; the sutural marking of the elytra between the suture and the first channel extends nearly half-way to the apex, the medial termination of it being not abruptly transverse, but pointed; between this marking and the shoulders there are traces of other markings also, suggesting the possibility of the whole anterior part of the elytra being fuscous: the apical marking broadly extends from the margination to the suture, its upper margin being obliquely circular; the boundary line at the suture is at the distance of one-fifth of the whole elytra, and from that point extends in a generally semicircular direction till it reaches the margination at about the same distance from the apex. The form also (as well as the sculpture, and to some degree the pattern) of *S. vicina* differs from that of the preceding species; it is (being a much smaller insect) more parallel, more attenuate; the sides of the elytra being manifestly more rounded.

I have a single specimen from La Ferté's Collection, received from Brazil; in the Collection also of Mr. Baly.

4. *S. æquinoctialis*, n. sp.

Oblongo-ovalis, subparallela, leviter canaliculata, flava, nigro-ornata: *caput* nigrum apparet, labro etiamque in fronte maculâ insulatâ flavis; ad frontem fovea est media obsoleta, a basi usque ad antennarum basin; *thorax* transversus est, latitudine (ad medium) vix duplo longitudine majori; apex modice excavatus est, basis transversa, latera rotundata et haud apicem versus constricta; sculptura ut in specie præcedenti; undique latè depressus (ad medium fovea longitudinalis apparet); quoad colorem niger, lateribus undique latè etiamque vittâ mediâ flavis; *scutellum* rotundato-triangulare, pube densâ flavâ vestitum; *elytra* subparallela, thorace paululum latiora, apice rotundata (elytrorum apicibus vix dehiscentibus); juxta suturam carina haud apicem attingens patet, et altera a humeris vix ad medium extendit; quoad colorem fascia media nigra (ad basin vittâ communi nigrâ juncta) etiamque apex latè niger elytra flava ornant; *antennæ* robustæ, nigræ; *pedes* nigri, femorum basibus fusco-adumbratis; *abdomen corpus*que subtus nigra.

Long. corp. lin. 4; lat. lin. $1\frac{3}{4}$.

This beautiful species is allied to *S. vicina*, but is readily separated from it by its different sculpture, as well as by its pattern of colours. I have a single specimen in my Collection received from Columbia.

5. *S. venusta*, n. sp.

Oblongo-ovalis, subparallela, leviter costata, nigra, flavo-ornata; *caput* ad medium foveolatum, nigrum; *thorax* transversus, latitudine vix duplo longitudinem superans, lateribus rotundatis, flavus, vittis duabus latis nigris mediis, parallelis; *scutellum* semicirculare, nigro-fuscum; *elytra* subparallela, elongata, leviter costata, nigra, fasciâ mediâ inæqualiter marginatâ, maculâ ad humeros longitudinali, alterâque apud scutellum minori, communi, flavis: *corpus* subtus, *pedes* et *antennæ* nigri.

Long. corp. lin. $3\frac{1}{2}$; lat. lin. $1\frac{1}{2}$.

Of the same size and generally of the same pattern as *S. æquinoctialis*; it differs however from that species by its less distinctly marked costa on the elytra, as well as by the difference of details of coloration: the two thoracic vittæ are broader, the humeral flavous markings are much smaller, and the flavous fascia of the elytra is medial, and not, as in *S. æquinoctialis*, post-

medial; in size also this fascia is narrower and not quite so irregularly wavy in form.

From the Amazon district; collected by Mr. Bates.

In the Collections of Mr. Baly and the Rev. H. Clark.

6. *S. frenata*, Guér. (Cuv. *Règne An. Ins.* p. 304).

Oblongo-ovalis, subparallela, costata, flava, lineis duabus a capite ad elytrorum medium fasciâque latâ mediâ nigris; *caput* omnino nigrum; *thorax* transversus, lateribus sinuato-rotundatis, apice subemarginato, basi transversa, anguli antici et præsertim postici rotundantur, ad medium fovea obsoleta vix apparet; thorax flavus est, lineis duabus submediis et parum obliquis a capite ad basin nigris; *scutellum* sat magnum, flavum; *elytra* thorace latiora, subparellela, ad apicem rotundata (apicibus singulis apud suturam haud dehiscentibus); costæ duæ (versus suturam) alteræque duæ penitus obsoletæ (versus marginem) apparent; hæ haud apicem attingunt; quoad colorem elytra flava sunt, fasciâ transversâ post-mediâ latâ lineisque duabus inter costas 1 et 2 nigris; *antennæ*, *pedes corpus*que subtus nigri.

Long. corp. lin. $4\frac{1}{3}$—$3\frac{1}{2}$; lat. lin. $2\frac{1}{3}$—$1\frac{3}{4}$.

I can trace no tendency to variation among the three specimens before me; the medial, or rather somewhat post-medial fascia is on its upper margin transverse, on its lower arcuate, being much broader at the suture than at the margination (both boundary lines being interrupted by the different costæ, and irregular); the breadth of the fascia at the suture is about one-third of the whole length of the elytra.

The species is found in Columbia.

In the Collections of Mr. W. Wilson Saunders and the Rev. H. Clark.

Schematiza dimidiata, Guér. (Cuv. *Règne An. Ins.* p. 303),

Is described by Guérin as from Dory, New Guinea, and placed by him next to *S. frenata*. I do not recognise the description, but whatever the species may be, it can hardly belong to the genus before us, which is exclusively South American.

7. *S. flavofasciata*, Guér. (Cuv. *Règne An. Ins.* p. 304),

Ovalis, subparallela, leviter costata, nigra, thoracis lateribus et elytrorum vittâ mediâ flavis: *caput* nigrum: *thorax* transversus, depressus, latera subrotundata apicem versus paulum

coarctantur; margines anterior et posterior ambo recti et transversi sunt; ad latera undique latè depressio fit; thorax niger est, lateribus (et interdum linea media obsoleta) flavis; *scutellum* nigrum; *elytra* subparallela, thorace latiora, humeris sat exstantibus, ad apicem rotundata, et haud ad suturam dehiscentia; undique 3 vel 4 sulci apparent, haud profundi, interdum obsoleti, haud apicem attingentes; quoad colorem elytra nigra sunt, ad humeros autem macula minuta, et ad medium fascia lata transversa, ad margines attingens, flavæ sunt; *antennæ* robustæ, nigræ; *pedes* et *corpus* subtus nigri.

Long. corp. lin. $3\frac{1}{2}$; lat. lin. $1\frac{3}{4}$.

S. flavofasciata differs from *S. lineaticollis* (*post*, p. 266), by its much greater breadth, its broader fascia, and its less distinctly-marked costæ on the elytra, as well as by the markings on the thorax; it is much smaller, and comparatively broader than *S. vicina* (*ante*, p. 262). The fascia of the elytron is transverse both at its superior and inferior margin, not oblique as in *S. frenata*; the line of margination is, however, not straight, but sinuate.

A form, which I take to be a variety of this species, is rather narrower in breadth, and has the humeral marking continued broadly to the medial fascia, the fascia itself being much more irregular in outline; it may be indeed that this will prove to be a separate species.

I took several specimens of *S. flavofasciata* when at Petropolis, near Rio Janeiro, with Mr. J. Gray, in February, 1857, and also at the same place specimens of the variety.

In the Collections of Mr. Wilson Saunders, Mr. Baly and the Rev. H. Clark.

8. *S. præusta*, n. sp.

Elongata, subparallela, costata, flavo-fulva, elytro singulo ad apicem rotundato, apice tenuiter nigro: *caput* nigrum; *thorax* modice transversus, depressus, latera sinuato-rotundata, margines autem anterior et posterior recti et transversi; thorax undique ad margines latè excavatus est; quoad colorem flavo-fulvus, maculâ mediâ insulari nigro-fuscâ; *scutellum* flavo-fuscum; *elytra* paulum thorace latiora elongata sunt et sat parallela; humeri vix exstant; inter suturam et marginem costæ tres apparent, una media, major, et undique altera minor, interdum obsoleta; hæ tres nec apicem attingunt; elytra flavo-fulva sunt, apex autem tenuiter fuscus est, ita et

basis (obsolete) prope scutellum; *antennæ* valde incrassatæ, apicem versus tenuiores, nigræ: *corpus* subtus *pedes*que nigri, horum femora (ad basin) flavo adumbrantur.

Long. corp. lin. $3\frac{1}{2}$; lat. lin. $1\frac{1}{4}$.

More narrow and elongate than its congeners, and, moreover, notable by its pale fulvous colour, the apex of the elytra only and the medial disc of the thorax alone being black.

I have two examples of the species before me, which differ in no respect from each other; one from Buenos Ayres, from M. Chevrolat, and the other from South Brazil, from M. Reiche's Collection.

9. *S. lineaticollis*, n. sp.

Elongato- et sub-ovalis, vix costata, nigra, flavo-ornata: *caput* nigrum, ad apicem rufo-flavum; *thorax* transversus, lateribus rotundatis et subsinuatis, transverse depressus, flavus, vittâ undique nigrâ, æquali, a margine anteriori usque ad basin pertingenti; *scutellum* subcirculare, flavum; *elytra* penitus parallela, versus apicem sublatiora, undique costis duabus brevibus obsoletis nec basin nec apicem attingentibus ornata; nigra, regione scutellari, margine undique ante-medio, et fasciâ latâ post-mediâ (versus margines ampliore) flavis; fasciæ margines haud recti sed inæqualiter instructi; *antennæ* robustæ, nigræ: *corpus* subtus et *pedes* omnino nigri.

Long. corp. lin. 3; lat. lin. $1\frac{1}{3}$.

The thorax of this species resembles that of *S. frenata* (*ante*, p. 264); but the elytra abundantly differ. The general pattern is the same, but in the species before us there is a flavous fascia on a black ground; in *S. frenata* the fascia is black and the elytra are flavous.

New Granada. From the Collection of M. La Ferté.

10. *S. nigricollis*, n. sp.

Elongata, parallela, subcostata, nigra, flavo-maculata: *caput* ad frontem longitudinaliter subfoveolatum, nigrum, labro et parte anteriori flavis; *thorax* transversus, latera rotundata et vix emarginata apparent, depressa tamen et marginata; quoad colorem thorax niger est, lateribus tenuiter flavis; *scutellum* subquadratum, nigrum; *elytra* parallela, attenuata, apud basin usque ad ante medium undique bi-costata, nigra; plaga lata, post-media, transversa, sed irregularis et inæqualiter instructa tertiam partem elytrorum occupat; *antennæ* satis

robustæ, nigræ : *corpus* subtus nigrum ; *pedes* quoque nigri, femorum anteriorum basibus flavo-adumbratis.

Long. corp. lin. $2\frac{3}{4}$; lat. lin. 1.

A beautiful little species from New Granada, to be separated from all others by its broad *post*-medial flavous band, as well as by its slender and parallel form, and its two abbreviated and slightly raised costæ on the elytra.

From the Collection of M. La Ferté.

§ A. Species elytris apice rotundatis.

b. Elytris planis.

11. *S. antennalis*, n. sp.

Elongata, parallela, nigra, flavo-notata : *caput* nigrum, antice infra antennarum basin flavum ; *thorax* transversus, depressus, lateribus subsinuatis vix rotundatis et versus apicem approximantibus, nigro-fuscus, ad latera latè flavus ; *scutellum* triangulare ; *elytra* satis parallela, confertim punctata, fusco-nigra ; apud humeros macula flava marginalis versus apicem extendit, alteraque minuta insulata undique apud apicem ; *antennæ* nigræ, robustæ, ad medium incrassatæ : *corpus* subtus nigro-fuscum ; *pedes* nigri, femorum basibus rufo-flavis.

Long. corp. lin. $2\frac{2}{3}$; lat. lin. $1\frac{1}{3}$.

A narrower and more elongate species than *S. apicalis* of this paper (*post*, p. 268), and differs also from it in the marginal marking of the elytra, and the coloration of the thorax.

Brazil.

12. *S. annulicornis*, n. sp.

Parallela, subdepressa, nigro-fusca, flavo-marginata : *caput* nigrum, ore et labro flavis ; *thorax* transversus, ad latera rotundatus et valde marginatus, nigro-fuscus, lateribus tenuiter flavis ; *scutellum* triangulare, rufo-fuscum ; *elytra* parallela, nigro-fusca, undique ad suturam (tenue) etiamque apud margines flavo-vittata (vittis æqualibus, rectis, et apicem attingentibus) : *corpus* subtus nigrum ; *antennæ* robustæ, nigro-fuscæ, articulo ultimo flavo, etiamque 3, 4 et 5 apud bases flavo-annulatis ; *pedes* nigri, femorum basibus flavis.

Long. corp. lin. 3 ; lat. lin. $1\frac{1}{2}$.

The only species of the genus in which the margins of the elytra are distinctly and evenly flavous.

A single specimen in my Collection, received by M. Chevrolat from Columbia.

13. *S. scutellaris*, n. sp.

Elongata, parallela, depressa, nigra, flavo-ornata: *caput* ad frontem depressum, flavum, labro et maculâ mediâ insulari ad basin nigris; *thorax* transversus, margine basali ad medium emarginato; latera parallela sunt, vix sinuata vel approximantia, sed ad angulos anticos breviter rotundata; thorax undique versus latera longitudinaliter quasi excavatus est; nigro-fuscus, latera latè et margo anterior tenuè flavescunt; *scutellum* subcordatum, nigro-fuscum; *elytra* parallela, plana, nigro-fusca; fascia lata media et ad humeros (apud margines), et versus apicem (sed tenuiter, et vix apicem ipsum attingens) sese latè extendit; fascia flava, margo autem undique suturalis fusco adumbratur; *antennæ* satis robustæ, nigræ; *pedes* et *corpus* subtus omnino nigri apparent.

Long. corp. lin. 3; lat. lin. 1.

S. scutellaris is not unlike in size and form *S. axillaris* of Guérin (Cuv. *Règne An.* 304), from Cayenne; it will be seen, however, to be somewhat more robust; the thorax also is different in form, the margins in Guérin's species being sub-contracted towards the apex, not parallel as in the species before us; the pattern also is obviously different; any black variety of *S. scutellaris* (should such exist) may, I believe, easily be separated by the above differences from the ordinary type of *S. axillaris*.

A single specimen is in my Collection, received by the Marquis La Ferté from Venezuela.

14. *S. apicalis*, n. sp.

Elongata, parallela, sed satis robusta, pube flavâ et sparsâ vestita, nigro-picea: *caput* nigrum, labro flavo; *thorax* latus, ad latera rotundatus, ad discum medium depressus, ita ut transversè excavatus apparet; rufo-flavus, ad medium fusco-niger; *scutellum* triangulare, nigrum; *elytra* parallela, rufo-fusca, crebre punctata, ad latera pube flavâ rarius vestita; apud apicem undique macula minuta apparet, flava, insulata; *antennæ* robustæ, nigræ: *corpus* subtus nigro-fuscum; *pedes* rufo-flavi, nigro-adumbrati.

Long. corp. lin. $2\frac{1}{2}$; lat. lin. $1\frac{1}{3}$.

At first sight this species appears to be a ♀ of *S. antennalis* (*ante*, p. 267); it is, however, quite distinct, not only in coloration (the legs being flavous instead of piceous, the elytra being without any marginal flavous marking, and the colour of the elytra

more tinged with rufous than in that species), but also in form; the elytra are manifestly more robust, and *more* approaching to cylindrical; and the whole insect is shorter and more evenly parallel.

New Granada. From the Collection of M. La Ferté.

§ B. Species elytris apice emarginatis.

15. *S. Hispiformis*, n. sp.

Oblonga, depressa, apicem versus dilatata, fortiter costata, flava, nigro-ornata: *caput* breve, foveolâ mediâ et excavatione undique ad oculorum margines; quoad colorem nigrum; *thorax* transversus, lateribus sinuato-rotundatis (vel aliquando ad medium emarginatis), discus medio longitudinaliter depressus, niger, latè undique flavus; *scutellum* subtriangulare, nigro-fuscum; *elytra* depressa, ad apicem latiora, apicibus rotundatis, apud suturam haud dehiscentibus, sed ad apicem ipsum undique valde rotundato-emarginatis; costæ quatuor elytron singulum ornant, duæ exstantes magnæ (juxta suturam et juxta marginem), inter has, et inter externam et marginem duæ alteræ apparent, minores (interdum quatuor omnes æquantur); inter costas majores vitta irregularis nigra a basi extendit ad maculam apicalem (hâc mâcula magnâ, et apud latera medium versus sese tendenti); *antennæ* robustæ, sat elongatæ, articulis 3—7 ampliatis: *corpus* subtus et *pedes* nigri.

Long. corp. lin. $4\frac{1}{2}$; lat. lin. $2\frac{3}{4}$.

The peculiar emargination at the extreme apex of the elytra is an abundant separation of the species before us from its congeners; in general form it reminds us at once of an *Odontota*, as is suggested by the excellent MS. name given it by M. Chevrolat, and which I preserve.

The species is found in Brazil. I captured three specimens at Petropolis in the Organ Mountains, during my visit there with Mr. John Gray, in February, 1857.

16. *S. emarginata*, n. sp.

Elongata, parallela, rufo-flava, thoracis medio elytrorumque basi scutellari et apice nigris: *caput* nigrum, frons autem ad antennarum insertionem rufo-fusca est; *thorax* transversus, latera sinuato-rotundata vel ad medium emarginata; margines anterior et posterior recti, transversi; thorax per totum discum depressus est, marginibus undique elevatis et quasi

sursum inflectis, nigro-fuscus, marginibus anterioribus et posterioribus tenuiter, lateralibusque latè flavis; *scutellum* fuscum; *elytra* parallela, sat elongata, costis undique tribus elevatis; hæ costæ haud ad apicem attingunt; ad apicem, suturam juxta, elytra valde emarginata sunt, ita ut apex ipse suturalis quasi mucronatus est; quoad colorem elytra flava vel rufo-flava apparent, sed sutura juxta scutellum apexque (latè et transversè) nigrescunt: *corpus* subtus *antennæque* nigræ; *pedes* etiam nigri, femorum basibus fusco-adumbratis.

Long. corp. lin. $3\frac{1}{2}$; lat. lin. $1\frac{1}{2}$.

The emargination at the apex of the elytra separates this species from all others before me except *S. Hispiformis*; in colour it approaches *S. præusta* (*ante*, p. 265).

Brazil. In the Collections of Mr. Baly and the Rev. H. Clark.

XII. *Descriptions of some new Species of Coleopterous Insects belonging to the Eupodous* Phytophaga, *Natives of the Old World and Australia.* By J. O. Westwood, M.A., F.L.S., &c.

[Read 3rd September and 7th November, 1864.]

The following pages contain descriptions of a number of new species of Coleopterous insects, belonging to the sub-families *Sagrides* and *Megalopides*, interesting for their geographical position. As the *Megalopides* are almost exclusively natives of the New World, the genera *Pœcilomorpha*, *Temnaspis* and *Leucastea* (to which the major part of the species subsequently described belong) may be considered as their Old World representatives. The species are generally of varied colours.

Genus Mecynodera, Hope.

Sp. 1. *Mecynodera Balyi.*

Picta brevior et pro magnitudine latior; læte fulva, capite, antennis, pedibus (basi femorum excepta) et maculis prothoracis et elytrorum nigris; tota glabra, nitida, et fere lævis; prothorace subquadrato, macula magna discoidali, in qua lunula profunde impressa, angulisque anticis nigris; elytris macula scutellari, semicirculo nigro (lineam curvatam punctorum valde impressorum includentem), macula subhumerali, fascia ultra medium lateraliter profunde punctata, maculisque duabus subapicalibus, nigris; metasterno intra pedes medios valde porrecto.

Long. fere ½ unc.

Habitat in Nova Hollandia, Hunter's River, D. Horsley. In Mus. Hopeiano Oxoniæ, olim nostro, Melly, H. Clark, &c.

Although I have been acquainted with this species more than twenty years, and had applied to it the specific name of *M. sculptilis*, I cordially adopt the name used above proposed for the species by the Rev. Hamlet Clark.*

* [Since the first part of this paper was read, a description and figure of *Mecynodera Balyi* have been published by the Rev. H. Clark in the Journ. of Entom. ii. 248.—*Sec. Ent. Soc.*]

Genus Ametalla, Hope.

Sp. 1. *Ametalla W-nigra.*

A. Spinolæ brevior et robustior, et *A. stenodera* crassior et paullo major; prothorace subcordato, angulis posticis extus paullo productis; nigra, subtus cum pedibus vix grisco-sericans, antennis (apice nigris), tibiis tarsisque obscure rufis; facie carina tenui polita inter oculos; prothorace punctis minutis obsito, medio late at non profunde impresso, rufescenti, disco angulisque anticis nigris; elytris subconvexis, fulvis, macula magna basali irregulari W simulante, fascia irregulari media apicibusque nigris; femoribus obscure rufis, posticis permagnis, macula magna nigra media notatis.

Long. corp. lin. 4.

Habitat in Nova Hollandia, Swan River. In Mus. Hopeiano Oxoniæ.

Genus Pœcilomorpha, Hope.

Sp. 1. *Pœcilomorpha Westermanni.*

Oblonga; elytris elongatis; capite porrecto; antennis brevibus, nigro-setosis, articulis 3io et 4to brevibus, 7 ultimis incrassatis, serratis, ultimis paullo minoribus; fulva, aureo-setosa; labro, fascia clypei, linea verticali longitudinali et per medium pronoti extensa, antennis, scutello, maculaque apicali elytrorum nigris; elytris punctatis; corpore infra piceo, impunctato, nitido; metasterno impressione profunda postica; pedibus piceo-nigris, femoribus magis rufescentibus; coxis anticis et basi femorum subtus flavis.

Long. corp. lin. $5\frac{1}{2}$.

Habitat in Guinea. In Mus. D. Westermann.

The elongated elytra (two and half times as long as the broadest part of the prothorax), and the rather more attenuated 10th and 11th joints of the antennæ, separate this species from the typical *Pœcilomorphæ.*

Sp. 2. *Pœcilomorpha Balyana.*

Nigra, nitida, flavo-varia; capite nigro, facie macula biloba flava nigro-setosa; clypeo ad basim nigro, apice cum labro flavo; palpis et antennis fulvo-brunneis; pronoto flavo, crebre punctato, maculis duabus clavatis disci ad marginem posticum conjunctis; scutello, humeris, maculis duabus in medio disci alterisque duabus majoribus subapicalibus elytrorum nigris; corpore infra nigro, setis griseis adpressis dense vestito; femoribus piceis (anticis pallidioribus), griseo-setosis; tibiis tarsisque fulvis.

Long. corp. lin. 4.

Habitat in Africa australi. In Mus. Hopeiano Oxoniæ (D. Baly dedit.)

P. Afræ, Klug, proxima, at minor, colore pallide flavo, antennis pedibusque pallidis, setisque nigris in apicibus elytrorum.

Sp. 3. *Pœcilomorpha luteipennis.*

Oblonga, parallela, nigra, nitida, pilis griseis dense vestita; antennis serrato-pectinatis; elytris pallide albido-luteis punctatis; segmento ultimo abdominis semicirculariter in medio impresso; femoribus posticis crassis; capitis vertice impresso inter oculos; elytrorum latitudine longitudinem vix duplo excedenti.

Long. corp. lin. 4.

Habitat in Sierra Leonum. In Mus. Britann. et D. Rev. Hamlet Clark.

Sp. 4. *Pœcilomorpha Gerstaeckeri.*

Oblonga, subparallela, crebre punctata; elytris profundius punctatis, rufo-fulva, luteo-setosa, dimidio apicali elytrorum fulvo; mandibulis, articulis 7 ultimis antennarum, maculisque duabus rotundatis in medio elytrorum, metasterni lateribus cum pleuris, macula ovali externa femorum posticorum, et basi segmenti ultimi ventralis (integri) nigris; femoribus posticis magnis, subtus pone medium tuberculo brevi conico armatis; tibiis 4 posticis valde curvatis; metasterno valde convexo.

Long. corp. lin. 4.

Habitat in Java (D. Goring). In Mus. Reg. Berolinensi.

Sp. 5. *Pœcilomorpha Lacordairii.*

Lata, pronoti lateribus pone medium valde rotundato-productis, flavescenti-fulva, glaberrima; capite et pronoti lateribus parce punctulatis et nigro-setulosis; elytris atris, vage punctatis, capitis macula frontali impressa alteraque in medio disci pronoti nigris; antennis fuscis, basi fulvis, articulis 7 ultimis vix serratis; meso- et meta-sterni lateribus nigris; pedibus nigris; femoribus 4 anticis basi fulvis, femoribus posticis crassis, dente subapicali armatis, flavis, extus macula magna basali notatis; tibiis 2 posticis fulvis, apice tarsisque nigris.

Long. corp. lin. $5\frac{1}{2}$.

Habitat Old Calabar. In Mus. DD. Murray et Baly.

I have great pleasure in retaining the specific name proposed

by Mr. Baly for this species in honour of one of the most philosophical entomologists of this or any previous age, who, in addition to great powers of generalization, is endowed with a remarkable aptitude for seizing the minute discriminations of species.

Sp. 6. *Pœcilomorpha parvula.*

Subcylindrica; capite prothoracis latitudine, hujus lateribus in medio rotundatis, basi et apice linea impressa constrictis, luteo-fulva, nitida, capite et pronoto fere lævibus, supra setis luteis et nigris instructa; elytris vage punctatis; antennis nigris, extus latis, serratis, articulis longius nigro-setosis, articulo basali fulvo; abdomine subtus, tibiis tarsisque cum apice elytrorum nigris; femoribus posticis mediocriter incrassatis.

Long. corp. lin. $2\frac{1}{3}$.

Habitat Old Calabar. In Mus. D. Murray.

Sp. 7. *Pœcilomorpha murina.*

Brevis, prothorace subconico, elytris e basi ad apicem sensim attenuatis; nigra, subopaca, creberrime punctulata, pubescentia brevi olivacea induta, plagis duabus longitudinalibus inter oculos alterisque duabus disci pronoti, maculis duabus triangularibus submediis ad latera elytrorum, duabusque subapicalibus, subnudis relictis; antennis nigris, articulis ultimis latis, serratis; pedibus et corpore subtus dense pubescentibus; femoribus posticis magnis, subtus inermibus; tibiis posticis in mare elongatis, curvatis, et in medio infra angulatis.

Long. corp. lin. $4\frac{1}{2}$—6.

Habitat Old Calabar. In Mus. D. Murray.

Var.—Elytris (detritis) obscure piceo-fulvis, margine et apice nigris, vel basi tantum rufescente, vel fascia tenui transversa pone medium, lutescenti.

The males in this species are larger than the females and are distinguished by having a slight angulation in the middle of the posterior tibiæ on the under-side.

Sp. 8. *Pœcilomorpha Calabarica.*

Parva, cylindrica, obscure fulva; capite et pronoto vix punctulatis, immaculatis; elytris chalybæo-nigris, punctatis; antennis apice serratis, nigris, articulo basali subtus fulvo; femoribus

fulvis, tibiis tarsisque nigris, fusco-hirtis; corpore subtus fulvo, abdomine nigro, apice segmentorum lutescenti.

Long. corp. lin. $3\frac{1}{4}$.

Habitat Old Calabar. In Mus. D. Murray.

This species is very close to the type *P. Passerinii*, but is considerably smaller, with black elytra and darker legs.

Sp. 9. *Pœcilomorpha variabilis.*

Subcylindrica; capite et prothorace æque latis et fere ejusdem magnitudinis, sublævibus; oculis magnis; elytris latioribus, humeris rotundatis, fere parallelis, vage punctatis; tota luteo-fulva vel fulva, nitida, vix pubescens; antennis nigris, articulis basalibus fulvis, apicalibus sublatis, subserratis, articulo 4to minimo; alis nigris; femoribus posticis vix incrassatis; tibiis curvatis. (Typus, vel *P. fulva.*)

Long. corp. lin. $3\frac{1}{2}$.

2da varietas (vel *P. lutescens*). Tota pallide lutescens, oculis paullo majoribus.

Long. lin. $2\frac{1}{2}$—$3\frac{1}{2}$.

3ia varietas (vel *P. basalis*). Typo convenit, at elytrorum dimidio basali piceo-nigro, in colorem fulvum sensim pallescenti.

4ta varietas (vel *P. subapicalis*). Typo convenit, at elytris piceo-nigris, regione scutellari et maculis duabus indistinctis subapicalibus fulvis, tibiis tarsisque nigris.

Long. lin. 2.

Habitat Old Calabar. In Mus. Hopeiano Oxoniæ et D. Murray.

After much consideration I feel induced to regard all the above-described insects as varieties of one species, their general form and punctation being identical.

Genus Temnaspis, Lacordaire.

Sp. 1. *Temnaspis arida.*

Robusta, prothorace (præsertim postice) capite multo latiori, angulis humeralibus elytrorum subacutis; tota fulva, crebre punctata, nitida, setis paucis pallidis vestita; elytris postice valde convexis; femoribus posticis crassis, piceo-castaneis, subtus magis rufis; corpore infra luteo-fulvo, metasterno obscuriori (magis castaneo), tuberculis duobus sat promi-

nentibus; abdomine piceo-nigro, basi (inter trochanteres posticos) pallide lutea.

Long. corp. lin. $5\frac{1}{3}$.

Habitat in Borneo. In Mus. D. Edw. Sheppard.

Sp. 2. *Temnaspis Cumingii* (Hope, MS.).

T. aridæ et *fervidæ* magnitudine et statura proxima: tota fulvo-lutea, nitida, supra vix setosa, sparsim punctata; capitis vertice impresso, prothorace postice latiori, angulis posticis rotundatis, humeris elytrorum prominentibus obliquis, antennarum articulis 7 ultimis tarsisque paullo obscurioribus; corpore toto infra fulvo-luteo; femoribus posticis versus apicem infra bispinosis, extus dimidio basali castaneo.

Long. corp. lin. $5\frac{1}{3}$.

Habitat in Manilla. D. Cuming. In Mus. Hopeiano Oxoniæ et D. Baly.

Obs.—Labium (sc. ligula) rotundatum et in medio marginis antici profunde semicirculariter incisum est.

Sp. 3. *Temnaspis chrysopyga.*

Elongata, fœmina breviori; capite lato, prothorace subrotundato, antice et postice vix constricto; nigra vel picea, vix nitida, mare brunneo, subtus nonnihil præsertim pedibus vario, fœmina obscuriori; valde setulosa setis griseis vel aureis, podice præsertim fœminæ dense vestito; elytris luteis, extus et apice obscuris, nigro-punctatis, punctis parvis, disco versus scutellum fere lævi; clypeo fulvo; antennis nigris, articulis apicalibus latis, serratis, articulo basali interdum subferrugineo; tibiis, præsertim posticis, in mare curvatis, podice ejusdem sexus in medio subcarinato, scutello nigro, apice late truncato.

Long. corp. ♂ lin. 7; ♀ lin. $5\frac{1}{2}$.

Habitat Old Calabar. In Mus. D. Murray.

The sexual distinctions in this species are more marked than in the majority of the insects of this genus, the head of the male being broader than the prothorax, and the body in this sex considerably more elongated than in the female and gradually attenuated to the extremity. In the specimens before me it is the female which has the extremity of the body so strikingly clothed with golden hairs.

Sp. 4. *Temnaspis Bengalensis.*

Fulva, nitida, sat rude punctata, luteo-hirta; capitis margine postico et macula antica brunneis; pronoto maculis duabus

magnis ante medium disci alteraque parva postica nigris; scutello brunneo; elytrorum humeris maculaque magna discoidali pone medium singuli nigris; prothorace subtus maculis duabus anticis; metasterno toto, fasciaque subapicali abdominis nigris; pedibus fulvis, femoribus posticis nigris, apice fulvis, subtus spinis duabus apicalibus armatis.

Long. corp. lin. 4.

Habitat in Ind. Orient., Bengal. In Mus. Hopeiano Oxoniæ.

Sp. 5. *Temnaspis lugubris.*

Nigra, subopaca, crebre punctatissima, griseo-setulosa; elytris in medio fasciis duabus indistinctis pallido-setosis; antennis pectinatis; pronoto linea media glabra; femoribus posticis valde incrassatis, unidentatis.

Long. corp. lin. $7\frac{1}{2}$.

Habitat in Madagascar. D. Goudot. In Mus. Reg. Berolinensi.

Corpus supra griseo-setosum, setis in maculas et fascias duas irregulares medias elytrorum dispositis, pilisque nigris varium. Antennæ articulis 7 ultimis clavam latam pectinatam formantibus. Clypeus cum tuberculo conico antico epistomatis lineaque media pronoti glabris et impunctatis. Prothorax antice et postice constrictus, parte latiori paullo pone medium sita. Elytra prope scutellum gibbosa, humeris prominentibus, basi fasciis duabus submediis maculisque duabus subapicalibus griseo-setosis. Corpus infra nigrum, setosum, lateribus metasterni coxisque posticis luteis. Femora incrassata, unidentata, in medio grisea. Tibiæ posticæ prope basin intus paullo dilatatæ et griseo-setosæ.

Genus Leucastea, Stål.

(*Pœcilomorpha, pars*, Baly.)

Sp. 1. *Leucastea rubidipennis.*

Nigra, nitida, punctata; pedibus griseo-setosis; faciei maculis duabus intra-ocularibus labroque rufis; elytris rubido-ferrugineis; antennarum articulis 7 ultimis submoniliformibus, subgracilibus; scutelli apice subtruncato.

Long. corp. lin. 4.

Habitat in Natalia. In Mus. Britann.

Sp. 2. *Leucastea Dohrni*, Stål, (Öfv. af K. Vet. Acad. Förhandl. 1855, p. 345.)

" Sordide lutescens, breviter pilosa, macula una frontis intra-

oculari, unaque thoracis utrimque laterali, elytrisque nigricantibus; antennis, tibiis basi et a medio apicem versus, tarsisque nigro-fuscis. Long. 8½ mill."

Habitat Port Natal.

Var.—Absque macula intra-oculari nigra, disco prothoracis immaculato, angulis lateralibus deflexis pronoti nigris, antennarum articulo basali subtus fulvo.

Long. 4 lin.

Habitat Zulu, Afr. merid. In Mus. D. Rev. Hamlet Clark.

Sp. 3. *Leucastea concolor.*

L. Dohrni omnino nisi coloribus convenit, elytrisque crebrius punctatis: tota sordide fulva, luteo-setosa; elytris magis lutescentibus; capite fulvo, macula parva intra-oculari antennisque nigris, harum articulo basali piceo; prothoracis disco ante medium maculis duabus rotundatis plus minusve obscuris; scutello nigro; capite infra macula nigra jugulari; prosterni lateribus, meso- et meta-sternis omnino nigris; abdomine fulvo, segmentis basalibus in medio nigro late maculatis; pedibus fulvis, geniculis, dimidio apicali tibiarum, tarsisque nigris.

Long. corp. lin. 4½.

Habitat in Natalia. In Mus. Reg. Berolinensi.

♀da var. (vel *L. nigricornis*). Maculis prothoracis fere obsoletis, antennarum articulo basali infra fulvo, scutello fulvo, metasterno fulvo, basim versus fuscato, abdomine toto fulvo.

Long. lin. 4.

Habitat Zulu. In Mus. D. Rev. Hamlet Clark.

3ia var. (vel *L. proxima*). Maculis prothoracis obsoletis, antennarum articulo basali infra fulvo, scutello nigro, apice truncato; pronoti angulis anticis deflexis, nigris; mesosterno anticè et lateribus nigris, nec non metapleuris et marginibus coxarum posticarum nigris.

Long. lin. 3.

Habitat in Natalia. In Mus. D. Baly.

Sp. 4. *Leucastea atripennis.*

Læte fulva, nitida; capite et pronoti lateribus vage punctatis, hujus disco lævi; elytris atris, regulariter punctatis; oblonga, capite prothorace minori, hujus lateribus rotundatis, basi et apice linea tenui subconstrictis; elytris latioribus, subparal-

lelis; antennis nigris, articulis 4 basalibus fulvis, apicalibus paullo crassioribus, subtrigonis; femoribus fulvis, posticis crassis, subtus in medio paullo angulatis; tibiis (2 posticis basi fulvis exceptis) tarsisque nigris.

Long. corp. lin. 4.

Habitat Old Calabar. In Mus. D. Murray.

This species might at first sight be mistaken for a large specimen of *Pœcilomorpha Malabarica*, but the structure of the antennæ at once indicates its distinction.

Sp. 5. *Leucastea dimidiata.*

L. Dohrni et *atripenni* statura et habitu proxima: cyaneo-nigra, nitida, parce setosa; capite et pronoto fulvis, clypeo macula rotunda intra-oculari fusca; antennis nigris; scutelli apice late truncato; thorace subtus cyaneo-nigro, nitido, griseo-villoso, margine postico pro- et meta-sterni fulvis; abdomine fulvo, segmento apicali integro; pedibus nigris, femoribus subtus plus minusve luteis, anticis fere omnino fulvis, posticis macula ovali utrinque fulva.

Long. corp. lin. 4.

Habitat in Natalia (Poeppig). In Mus. Reg. Berol.

Sp. 6. *Leucastea Westermanni.*

Præcedentibus statura et habitu convenit: tota picea, nitida, luteo-setosa, setis pedum longioribus; antennarum articulis basalibus apice rufescentibus; capite infra, metasterno, ventreque obscure fulvis, segmentorum marginibus pallidioribus; pedibus piceis, femoribus posticis subtus fulvis, subincrassatis, et in medio infra paullo angulatis.

Long. corp. lin. 4.

Habitat in Guinea. In Mus. D. Westermann.

Sp. 7. *Leucastea antica.*

Oblonga, prothoracis lateribus pone medium rotundatis, elytris subparallelis, capite et pronoto glabris, hoc fere lævi, elytris punctatis; fulva, elytris magis testaceis sparsim luteo-setosa, margine postico clypei maculaque in medio faciei et scutello obscuris; antennis nigris; thorace subtus nigro, nitido; abdomine fulvo; pedibus nigris, griseo-hirtis; femoribus anticis infra fulvis.

Long. corp. lin. 3.

Habitat in Natalia. In Mus. D. Rev. Hamlet Clark.

Sp. 8. *Leucastea ephippiata.*

Oblonga, nitida; prothoracis lateribus pone medium rotundatis et capite paullo latioribus; elytris pone medium parum latioribus; pallide fulva, capite et prothorace sublævibus, setosis; antennis fulvis; elytris fulvo-albidis, dimidio basali piceo-nigris; tarsorum apicibus fulvis.

Long. corp. lin. $3\frac{2}{3}$.

Habitat in Africa occidentali. In Mus. D. Hamlet Clark.

Genus Pedrillia, (n. g.).

Temnaspidi proximum; differt corpore parvo, breviori et crassiori: elytris postice valde convexis; pronoto pone medium valde constricto, antennis elongatis, ad medium elytrorum extensis, articulis e 3tio sensim incrassatis, haud serratis; palpis maxillaribus articulo ultimo conico; labii margine antico fere recte truncato; scutelli apice truncato; femoribus posticis incrassatis, haud spinosis, tibiis curvatis, unguibus tarsorum basi valde dilatatis.

Sp. 1. *Pedrillia longicornis.*

Testaceo-rufa, fulvo-setosa; capite et pronoto punctulatis; elytris punctatis; antennis nigris, articulo basali luteo basi obscuriori, 2do obscuro; pedibus nigris, tibiarum basi piceo-fusca; tarsis piceis; corpore infra ferrugineo; meso- et metasterni lateribus et segmento 5to ventrali nigris.

Long. corp. lin. $2\frac{1}{4}$.

Habitat in Ind. Orient., Bombay. In Mus. Britann. et D. Baly.

XIII. *A Monograph of the Genus* Yphthima ; *with Descriptions of two new Genera of Diurnal Lepidoptera.* By W. C. Hewitson, F.L.S.

[Read December 5th, 1864.]

I have myself experienced so much difficulty in determining the species of the genus *Yphthima*, as to believe that if I have successfully worked it out, I shall have been of some use. It is an excellent genus ; I have neither admitted nor rejected any species about which I have the least doubt. Some of the new species are from the Collection of Mr. Wallace.

The genus *Cœnyra* is nearly allied to *Yphthima*, as well as to *Cœnonympha;* from both it differs in the neuration of the wings, from *Cœnonympha* in its very different palpi.

Genus Cœnyra, Hewitson.

Head small; eyes small. Palpi long, straight, much compressed, thickly clothed with hair; the third joint long and nearly naked. Antennæ slender, short, slightly and gradually thickened to the point.

Anterior wing rounded; costal margin arched, apex and outer margin rounded; inner margin nearly straight; costal nervure much swollen at the base, extending to the middle of the margin; subcostal nervure with four equi-distant branches, two before the end of the cell; discoidal cell half the length of the wing, the nervures which close it forming a regular curve inwards, the first obsolete, the second and third of equal length, joining the third branch of the median nervure at a distance from its base.

Posterior wing very round ; the costal nervure reaching a little beyond the middle of the margin; the subcostal branched before the end of the cell; the disco-cellular nervules, which close the cell obliquely, are slightly curved inwards, the first being half as long as the second.

Cœnyra Hebe. (Pl. XVII. figs. 1, 2.)

Yphthima Hebe, Trimen, Tr. Ent. Soc. 3rd Ser. i. 280.
Cœnyra Corycia, Hewitson.

Alis rufo-brunneis ; anticis utrinque biocellatis ; posticis supra quatuor, subtus ocellis sex ; omnibus argenteo-pupillatis.

Female.—Upperside pale brown ; both wings crossed by indis-

tinct bands of darker brown, both with two submarginal bands of brown. Anterior wing with two ocelli: posterior wing with six: each black, with silver pupil, yellow iris, and rufous border.

Underside as above, except that it is paler.

Male like the female, except that it is darker, and has the ocelli on the upperside of the posterior wing much less distinct.

Exp. $1\frac{1}{2}$ inch.

Hab. Natal.

In the Collection of W. C. Hewitson.

Genus Xois, Hewitson.

Head large; eyes large, smooth. Palpi rather short, densely clothed with long hair, the last joint short, naked, pointing outwards. Antennæ short, gradually thicker from the middle to the point.

Anterior wing short; costal margin arched, apex and outer margin rounded; inner margin straight; costal nervure swollen at the base, extending to the middle of the margin; subcostal nervure with four branches, the first before the end of the cell, the other three branches equi-distant from each other, more distant from the first; the discoidal cell short and broad, closed obliquely by the nervures, the first very short; the third, which is a little longer than the second, joins the third median nervule at a distance from its base.

Posterior wing very round; the costal nervure extending three-fourths the length of the wing; the discoidal cell more than half the length of the wing, closed obliquely by the disco-cellular nervules, the second nervure three times the length of the first.

Xois Sesara, n. s. (Pl. XVII. figs. 3, 4.)

Alis albis; anticis marginibus fuscis, utrinque ocello maximo, argenteo-bipupillato; subtus rufis, fusco-undulatis.

Female.—Upperside white. Anterior wing grey brown, with a large spot of white on the inner margin; a large ocellus towards the apex, with two pupils of silver blue; the iris orange, bordered with brown; the base of the costal margin rufous, the outer margin broadly brown.

Underside rufous-orange. Anterior wing with the ocellus as above, spotless with the exception of some slight undulations near the apex. Posterior wing undulated throughout with dark brown.

Exp. $1\frac{5}{10}$ inch.

Hab. Fiji.

In the Collection of W. C. Hewitson.

Genus Yphthima, Hübner.

1. *Yphthima Asterope.*

Hipparchia Asterope, Klug in Ehrenb. & Hempr. Symb. Phys. pl. 29, figs. 11, 12, 13, 14; Lederer, Beit. Schm. Asia Minor, pl. 1, f. 6.

Yphthima Norma, Westw. in Gen. Diur. Lep. pl. 67, f. 1.

Alis fuscis; anticis singulis ocello unico; subtus cineraceis, rufo-undulatis; posticis ocellis tribus argenteo-pupillatis.

Exp. $1\frac{5}{20}$ to $1\frac{10}{20}$ inch.

Hab. Syria, China, Natal, Calabar.

In the Collection of W. C. Hewitson.

This species may be easily known from all others by the circular band of brown which passes round the ocellus on the underside of the anterior wing, as well as by a rufous space (sometimes clouded with brown) below the said circular band free from undulations. As will be seen from the localities quoted, it is widely distributed, and differs considerably in size. *Y. Norma*, of Westwood, from China, I believe to be only a small variety of this species, darker and wanting the ocellus on the upperside of the anterior wing; there are similar varieties from the Holy Land. Specimens from Calabar and Natal do not differ from those of Europe, except in having the ring of brown which encircles the ocellus of the anterior wing more distinctly marked above, as in *Norma*, and in having the underside more clouded with rufous striæ.

2. *Yphthima Arctous.*

Papilio Arctous, Fabricius; Godart, Encl. M. p. 552; Boisduval, Voy. Astrol. p. 156.

Alis fuscis; singulis utrinque ocello unico; subtus griseis, rufo-undulatis.

Exp. $1\frac{9}{20}$ inch.

Hab. Aru, Port Denison.

In the Collection of W. C. Hewitson.

Very nearly allied to *Y. Asterope*, but differs from it in wanting two of the ocelli of the posterior wing.

Each of the authors above referred to, in describing this species, expressly states that it has *one ocellus and one only* on each wing, above and below; and yet they one and all refer to Donovan's figure, in his "Insects of New Holland," plate 24, which has *two ocelli* on both sides of the posterior wing. Donovan's

figure may represent a variety of this species, but it seems to me better to consider it distinct, if we are to depend upon the number of ocelli to denote specific distinction.

3. *Yphthima Arctoides.*

Papilio Arctous, Donovan, Ins. New Holland, pl. 24.

Alis fuscis ; anticis utrinque ocello unico, posticis duobus.

4. *Yphthima Philomela.*

Yphthima Philomela, Hübner, Zutr. f. 83, 84.

Alis fuscis ; anticis utrinque ocello unico ; posticis supra duobus, subtus albis, rufo-undulatis, ocellis quatuor.

The four ocelli on the underside of the posterior wing are placed thus: one near the apex, and three together towards the the anal angle ; they are indistinctly pupilled with silver.

5. *Yphthima Inica*, n. s. (Pl. XVII. fig. 5.)

Alis rufo-fuscis ; omnibus supra ocello unico ; subtus cineraceis, rufo-undulatis, anticis ocello unico.

Female.—Upperside rufous-brown, with a single ocellus on each wing.

Underside with rufous undulations throughout. Anterior wing with the ocellus as above. Posterior wing without ocelli, clouded with darker colour.

Exp. $1\frac{7}{10}$ inch.

Hab. East India.

In the Collection of the British Museum.

Closely allied to *Y. Asterope*, but without the circular brown band which surrounds the ocellus on the anterior wing of that species, and also without the rufous space (devoid of undulations) near the anal angle.

6. *Yphthima Nareda.* (Pl. XVII. figs. 6, 7.)

Satyrus Nareda, Kollar in Hugel's Reise n. Kaschmir, p. 451.

Alis fuscis ; singulis supra ocello unico ; subtus cineraceis, rufo-undulatis, anticis ocello unico, posticis tribus.

Exp. ♂ $1\frac{5}{10}$, ♀ $1\frac{8}{10}$ inch.

Hab. Northern India.

In the Collection of W. C. Hewitson.

I have no doubt that figs. 6 and 7 of the plate, although of very different colour, are the sexes of the same species ; others

in my Collection are of an intermediate tint. The anal ocellus of the male has only one pupil, that of the female has two.

7. *Yphthima Chenu.*

Satyrus Chenu, Guérin-Méneville in Delessert, Souv. Voy. Ind. pl. 21, f. 2, p. 77.

Alis fuscis; singulis supra ocello unico; subtus cineraceis, rufo-undulatis, anticis ocello unico, posticis fasciis tribus rufis ocellisque quatuor.

Exp. $1\frac{1}{2}$ inch.

Hab. Neelgherry Mountains.

In the Collection of W. C. Hewitson.

Underside grey, undulated throughout with rufous-brown. Anterior wing crossed by two bands, one on each side of the ocellus and meeting at the inner margin, so as to form a triangle. Posterior wing with five ocelli, one (the largest) apart from the rest near the apex; crossed by three bands of rufous-brown; the space between the second and third bands nearly white.

Mr. Moore has inadvertently considered this species and *Y. Philomela* as the same.

8. *Yphthima Stellera.*

Hipparchia Stellera, Eschsch. Voy. Kotzebue, pl. 10, f. 24.

Yphthima Sempera, Felder, Wien. Ent. Monats. vol. vii. p. 125.

Alis rufo-fuscis; anticis supra ocello unico, posticis quatuor; subtus cineraceis, rufo-undulatis et bifasciatis, posticis ocellis sex geminatis.

Exp. $1\frac{3}{10}$ inch.

Hab. Manilla.

In the Collection of W. C. Hewitson.

Underside white, undulated with rufous-brown, both wings crossed before the middle by two bands of rufous-brown, the margins and a submarginal band dark brown; anterior wing with one large ocellus, posterior wing with six, in pairs, all with pupils of silvery blue, the irides yellow.

Mr. Semper has kindly sent me examples of the butterfly to which Dr. Felder has given his name, but I cannot see any difference whatever to separate it from *Y. Stellera*.

9. *Yphthima Baldus.*

Papilio Baldus, Fabricius, Ent. Sys. iii. p. 323; Godart, Encl. M. p. 551; Donovan's Ins. India, Pl. 36.

P. Lara, Donovan, Nat. Repos. pl. 71.

Alis fuscis; anticis utrinque ocello unico; posticis supra ocellis quatuor, subtus sex.

Male.—Underside grey-white, undulated throughout with rufous-brown, and crossed by irregular bands of the same colour; the ocellus on the anterior wing large; the ocelli of the posterior wing six, *rarely touching*, placed in pairs apart from each other, and *at very different distances from the outer margin;* the pupils of all the ocelli brilliant silver.

Female like the male, except that the wings are broader, and the ocelli more distinct.

Exp. $1\frac{4}{10}$—$1\frac{6}{10}$ inch.

Hab. India, Java, Sumatra, Macassar.

In the Collection of W. C. Hewitson.

This is the variable species of the genus: examples differ greatly in size; some have the ocellus of the anterior wing small and obscure; some have the underside more closely undulated than others; in one the six ocelli of the underside are very minute and deformed, another is without the ocellus on the upperside of the anterior wing.

I have included Donovan's *Lara*, which does not differ from his figure of *Baldus*. Donovan quotes the Linnæan description of *Lara*, and states that his figure was copied from the specimen described by Linnæus in the Linnæan cabinet. Now it so happens that the description referred to is that of one of the *Lycænidæ* from the Cape, closely allied to, if not identical with, *P. Iolaus* of Cramer (*Zeritis Lara* of the "Genera of Diurnal Lepidoptera"). It is true that there is an *Yphthima* in the Linnæan Collection from which Donovan's figure may have been drawn, but Linnæus has not described it. Mr. Westwood has inadvertently erred in the same way in the "Genera," and has kindly assisted me to rectify his mistake; and, in pointing out an error, I think it only fair to him to express my admiration at the almost unerring accuracy with which his part of that work was accomplished.

10. *Yphthima Lysandra.*

Papilio Lysandra, Cramer, pl. 293.

Alis fuscis; anticis utrinque ocello unico; posticis supra ocellis duobus, subtus quinque.

Very nearly allied to *Y. Baldus*, and though it differs from it in having usually two ocelli only on the upperside of the posterior wing, there are sometimes indications of others, and, although it has also five ocelli only on the underside of the said wing, the anal ocellus has two pupils; these ocelli are however much more distinct and *more nearly in a line*, and the band of rufous-brown which precedes the ocellus on the underside of the anterior wing is nearer to it. This species, like *Baldus*, is sometimes without the ocellus on the upperside of anterior wing.

11. *Yphthima Itonia*, n. s. (Pl. XVIII. fig. 13.)

Alis fuscis; anticis utrinque ocello unico magno; posticis supra ocellis quinque; subtus cineraceis, rufo-undulatis, posticis ocellis septem.

Male.—Upperside grey-brown. Anterior wing with one large bipupilled ocellus. Posterior wing with five, one minute near the apex, two larger between the median nervules, and two minute near the anal angle, all black; the pupils silver; the irides orange-yellow.

Underside with rufous undulations throughout. Both wings crossed near the middle by an indistinct rufous band. Anterior wing with the large ocellus as above; posterior wing with seven; the first and third obsolete.

Female like the male, except that the ocelli on both sides are much more distinct, and that the posterior wing has seven perfect ocelli.

Exp. ♂ $1\frac{2}{10}$, ♀ $1\frac{4}{10}$ inch.

Hab. White Nile.

In the Collections of the British Museum and W. C. Hewitson.

12. *Yphthima fasciata*, n. s.

Alis fuscis, griseo-undulatis; anticis utrinque ocello unico; posticis supra ocellis sex; subtus cineraceis, rufo-undulatis, posticis trifasciatis, ocellis septem.

Upperside brown. Both wings undulated with grey, chiefly beyond the middle; both crossed at the middle by a common band

of darker colour, the margins dark brown. Anterior wing with one large bipupillated ocellus; posterior wing with five or six obscurely marked upon a band of rufous-brown.

Underside grey, beautifully undulated throughout with rufous-brown; both wings crossed by two bands of darker colour. Anterior wing with the ocellus as above but more distinct; posterior wing with seven small ocelli of nearly equal size, placed as above upon a band of rufous-brown, all black, the pupils silver, the irides orange-yellow.

Exp. $1\frac{1}{2}$ inch.

Hab. Sarawak, Sumatra.

In the Collection of W. C. Hewitson.

When the plates were drawn I believed that this species might be only a variety of *Y. Itonia*, as it is the only other species which has seven ocelli on the posterior wing; I now think it better to consider it as a distinct species. It is larger than *Y. Itonia*, has a distinct band of darker colour crossing the middle of both wings on the upperside, and is easily known from all the other species by having *two transverse* bands on the underside of both wings, and on the posterior wing a third band in which the ocelli are placed. It is from the Collection of Mr. Wallace. Bears great resemblance to *Y. Baldus*, but instead of having the ocelli in pairs and apart as in that species it has them in a line.

13. *Yphthima Ceylonica*, n. s. (Pl. XVIII. figs. 14, 15.)

Alis fuscis; anticis utrinque ocello unico; posticis dimidio posteriore niveo, ocello unico; subtus niveis, rufo-undulatis, posticis ocellis quatuor.

Upperside rufous-brown. Anterior wing with one large ocellus, with two silver pupils. Posterior wing with the outer half white, the outer margin and a submarginal line of black; one obscure ocellus and a minute black spot.

Underside white, undulated with rufous-brown. Anterior wing with the ocellus as above; thickly undulated towards the outer margin; posterior wing slightly undulated near the margins, with four ocelli, one near the apex, three near the anal angle, the outer ocellus minute, blind, the anal ocellus with two pupils of silver.

Exp. $1\frac{2}{10}$ inch.

Hab. Ceylon.

In the Collection of W. C. Hewitson.

The ocelli on the underside of the posterior wing differ much. In

one specimen, three are perfect, one blind; in another two only are perfect.

14. *Yphthima Loryma*, n. s. (Pl. XVIII. figs. 16, 17.)

Alis fuscis; anticis nonnunquam ocello unico; posticis supra duobus; subtus cineraceis, rufo-fasciatis undulatisque, posticis ocellis tribus.

Male.—Upperside dark brown, broadly rufous at the outer margins; a submarginal band of dark brown. Anterior wing with one obscure blind ocellus; posterior wing with two, both near the anal angle; the pupils silver, the irides very narrow, rufous.

Underside white, undulated throughout with rufous-brown; anterior wing with the ocellus rufous-brown, with two silver pupils; crossed on each side of the ocellus by bands of rufous-brown. Posterior wing with three black ocelli, one near the apex, two near the anal angle, the pupils silver, the anal ocellus with two pupils; crossed by several short bands of rufous-brown.

Female does not differ from the male, except in its larger size, and greater breadth of wing.

Exp. $1\frac{6}{10}$—$1\frac{9}{10}$ inch.

Hab. Macassar, Celebes.

In the Collection of W. C. Hewitson.

This species by the variety, fig. 16, from Celebes, approaches nearly to *Y. Pandocus* as well as to *Y. Amphithea*.

15. *Yphthima Amphithea*.

Yphthima Amphithea, Ménétriès, in Schrenck's Amur-Lande, pl. 3, f. 10, p. 41.

Alis fuscis; anticis utrinque ocello unico; posticis supra duobus; subtus obscuris, rufo-undulatis, posticis ocellis tribus.

Exp. $1\frac{8}{10}$ inch.

Hab. Amoor-land, Sula.

In the Collection of W. C. Hewitson, from Mr. Wallace.

The difference between this and the last-described species is chiefly one of colour. On the underside *Y. Amphithea* is entirely suffused with rufous-brown. It is, as described by Ménétriès, of peculiar form, the outer margin of the anterior wing being slightly sinuated towards the anal angle. The figure in the Amur-Lande is a very bad one.

16. *Yphthima Pandocus.* (Pl. XVIII. fig. 12.)

Yphthima Pandocus, Moore in Horsfield and Moore, Cat. Lep. E. I. C. p. 235.

Alis fuscis; anticis utrinque ocello unico; posticis supra duobus; subtus albis, rufo-nebulosis et undulatis, posticis ocellis tribus.

Exp. $1\frac{9}{10}$ inch.

Hab. Java, Sarawak.

In the Collection of W. C. Hewitson.

17. *Yphthima Motschulskiji.*

Satyrus Motschulskiji, Bremer, Beitr. zur Fauna Nord. China; Ménétriès, Cat. Lep. Mus. Acad. Petrop. pl. 6. fig. 5.

Alis fuscis; singulis supra ocello unico; subtus cineraceis, rufo dense undulatis, posticis ocellis tribus.

Exp. $1\frac{7}{10}$ inch.

Hab. Pekin, Amoy.

In the Collection of W. C. Hewitson.

Very near to *Y. Pandocus*, but differs from it on the upperside, in having the iris of the anterior wing slightly divided, and in having one ocellus only on the posterior wing. On the underside it is undulated throughout, and has the apical ocellus of the posterior wing larger, and bears a great resemblance to *Y. Nareda* except in colour.

18. *Yphthima Sakra.* (Pl. XVIII. fig. 18.)

Yphthima Sakra, Moore, Horsfield and Moore, Cat. Lep. E. I. C. Mus. p. 236.

Alis fuscis; anticis utrinque ocello unico; posticis supra duobus, subtus quinque ocellis.

Exp. 2 inches.

Hab. North India.

In the Collection of W. C. Hewitson.

Mr. Moore describes this species as having four ocelli on the upperside of the posterior wing. Some examples have four; others have only two, being without the ocelli near the apex and anal angle.

19. *Yphthima Methora*, n. s. (Pl. XVIII. figs. 20, 21.)

Alis rufis, griseo-undulatis ; anticis utrinque ocello maximo ; posticis supra quinque, subtus sex ocellis.

Female.—Upperside brown, undulated with grey towards the outer margins ; the outer margins and fringe rufous-brown, traversed by a grey line. Anterior wing with one very large two-pupilled ocellus on both sides ; posterior wing with five, all black, with pupils dull silver, with irides rufous, narrow.

Underside grey, closely undulated throughout with rufous-brown ; both wings crossed at the middle by a curved rufous band ; posterior wing with six ocelli in pairs ; the pupils of bright silver ; the irides orange-yellow.

Exp. 2 inches.

Hab. North India.

In the Collection of W. C. Hewitson.

Nearest to *Y. Sakra*, but of very different aspect.

20. *Yphthima Hyagriva*. (Pl. XVIII. fig. 11.)

Yphthima Hyagriva, Moore, Horsf. and Moore, Cat. Lep. E. I. C. Mus. p. 236.

Alis fuscis ; singulis supra ocello unico ; subtus rufo griseoque undulatis, posticis ocellis quatuor geminatis.

Exp. $1\frac{9}{10}$ inch.

Hab. Dargeeling.

In the Collection of W. C. Hewitson.

Easily known from all the other species by the broad submarginal line of brown on both sides, by the geminated oval ocelli near the apex of the posterior wing, and the ochreous colour of the underside.

21. *Yphthima Narasingha*. (Pl. XVIII. fig. 19.)

Yphthima Narasingha, Moore, Horsf. and Moore, Cat. Lep. E. I. C. Mus. p. 236.

Alis fuscis ; anticis utrinque ocello unico ; subtus cineraceis, rufo-undulatis, posticis punctis minutis albis.

Exp. 2 inches.

Hab. Dargeeling.

In the Collection of W. C. Hewitson.

The only species which has no ocelli on either side of the pos-

terior wing. On the underside some minute white spots occupy the place where in other species the ocelli are placed.

22. *Yphthima Sepyra*, n. s. (Pl. XVII. fig. 10.)

Alis rufis, griseo-undulatis ; anticis utrinque ocello unico ; posticis utrinque sex, subtus geminatis.

Male.—Upperside brown, paler round the ocelli, with a submarginal line of darker brown. Anterior wing with the usual ocellus on both sides ; posterior wing with two or more.

Underside grey, closely undulated with broad rufous-brown striæ ; both wings crossed by a band of brown before and after the ocelli ; posterior wing with six ocelli, geminated, all with pupils of silver and broad irides of orange-yellow.

Female does not differ, except that it is slightly undulated with grey round the ocellus of the anterior wing.

Exp. $1\frac{6}{10}$ inch.

Hab. Gilolo, Batchian.

In the Collection of W. C. Hewitson, from Mr. Wallace.

The ocelli on the upperside of the posterior wing differ much in number ; sometimes there are only two, sometimes a third near the apex, occasionally two at the anal angle, and in one, a female, there are six as below.

23. *Yphthima Aphnius*. (Pl. XVII. figs. 8, 9.)

Satyrus Aphnius, Godart, Encl. M. p. 551.

Alis rufo-fuscis ; anticis utrinque ocello unico ; posticis supra fascia fulva, ocellis duobus punctoque minuto ; subtus albis, rufo-undulatis, ocellis minutis quatuor cæcis.

Upperside rufous-brown, with a submarginal band of dark brown. Anterior wing with the usual ocellus on both sides, broadly bordered with orange and pupilled with silver. Posterior wing with a large spot of orange beyond the middle, marked with two small ocelli and a minute spot.

Underside. Anterior wing rufous-brown, undulated with grey ; posterior wing white, undulated with rufous-brown ; the costal margin broadly clouded and undulated with brown ; six minute blind ocelli in pairs, those at the anal angle deformed.

Exp. $1\frac{1}{2}$ inch.

Hab. Timor, Isle of France.

In the Collection of W. C. Hewitson, from Mr. Wallace.

24. *Yphthima Tamatavæ.*

Satyrus Tamatavæ, Boisduval, Faune Ent. de Madagascar, pl. 8, figs. 6, 7.

Alis rufo-fuscis; anticis utrinque ocello unico; posticis supra ocellis duobus; subtus anticis apice griseo-undulato; posticis griseo fuscoque nebulosis.

Male.—Upperside dark rufous-brown. Anterior wing with the ocellus on both sides with a broad rufous-orange iris; posterior wing with two ocelli touching, all with silvery blue pupils.

Underside. Anterior wing as above, except that it is undulated with grey near the costal and outer margins; posterior wing grey, clouded and undulated with dark rufous-brown, crossed from the middle of the costal margin to the middle of the wing by a broad band of brown marked with a white spot.

Female like the male, except that the anterior wing has the outer margin broadly dark brown, traversed by a line of pale grey-brown, and that the underside is more beautifully variegated (like *Satyrus Semele.*)

The figure in the Faune Ent. de Madagascar is very much paler than any examples which I have seen, and gives no idea of the beauty of the insect. I have not seen an example with a third ocellus on the posterior wing, nor with the prolongation of the rufous spot, as shown in Dr. Boisduval's figure.

EXPLANATION OF THE PLATES.

Plate XVII.

Figs. 1, 2. *Cœnyra Hebe*, Trimen.
Figs. 3, 4. *Xois Sesara*, Hewitson.
Fig. 5. *Yphthima Inica*, Hewitson.
Figs. 6, 7. ,, *Nareda*, Kollar.
Figs. 8, 9. ,, *Aphnius*, Godart.
Fig. 10. ,, *Sepyra*, Hewitson.

Plate XVIII.

Fig. 11. *Yphthima Hyagriva*, Moore.
Fig. 12. ,, *Pandocus*, Moore.
Fig. 13. ,, *Itonia*, Hewitson.
Figs. 14, 15. ,, *Ceylonica*, Hewitson.
Figs. 16, 17. ,, *Loryma*, Hewitson.
Fig. 18. ,, *Sakra*, Moore.
Fig. 19. ,, *Narasingha*, Moore.
Figs. 20, 21. ,, *Methora*, Hewitson.

XIV. *On the Reversion and Restoration of the Silkworm* (Part II.); *with Distinctive Characters of Eighteen Species of Silk-producing* Bombycidæ. By Captain Thomas Hutton, F.G.S., of Mussooree. (Communicated by Mr. F. Moore.)

[Read December 5th, 1864.]

According to hitherto received notions all the silkworms now under domestication are mere varieties of one species, and are all placed together under the name of *Bombyx Mori;* and yet the difference in habits is alone sufficient to point out the existence of several totally distinct species.

This circumstance, when some time since noticed by myself in a letter to Mr. F. Moore of the India Museum, elicited the acknowledgment that Entomologists in Europe had long suspected the fact, but that they were without the means of working out all the necessary details, many of the supposed species not being under cultivation in Europe, while no one in India had deemed it worth while to enter into an investigation of the subject.

From the moment, however, in which I first recognized the absolute necessity of endeavouring to arrest the rapid strides which disease was making towards the extinction of the silkworm, I became aware, from actual inspection of the worms through all their changes, of the existence of several species, and I at once determined systematically to set to work for the purpose of extricating each from the dark labyrinth of error and confusion in which it had become involved.

Any one at all conversant with the *Bombycidæ* must be aware of the fact that, for the most part, the species will, in the northern and colder districts of their respective countries, be either strictly annuals, or at the most double-brooded, while those species which yield several crops of silk during the year, indicate thereby that they were originally imported into the localities where they are now domesticated, from the warm and more prolific lowland regions of the South. A rapid succession of crops, whether of vegetables or of silk, such as we witness among what are in Bengal termed "monthly worms," is obtainable only, whether naturally or artificially, in a mild climate favourable to the rapid growth of vegetation. To the preservation of such species, when in a state

of natural freedom, the healthy condition of the mulberry leaf until the commencement of the winter months is indispensable, and such a condition of things is obtainable only in a warm and probably humid climate.

At Mussooree in the North-Western Himalaya, nature herself speaks forcibly in support of this view when she presents for our consideration *twelve* wild species of the *Bombycidæ*, eleven of which are here strictly annuals, and one only is double-brooded, though some of these in warmer parts of India are found, even in the wild state, to yield two and even three broods.

Meditating on this fact, it occurred to me that if this could be relied upon as a distinguishing feature, the annual domestic worms would doubtless, on investigation, be found to be specifically distinct from the so-called "monthly worms," and the result has proved the correctness of this view, the Cashmere and Bokhara Annual being not only distinct from the Bengal Annual (*Boropooloo*), but both are distinct from the "*Nistry*," the "*Dasee*," and the small Chinese species *Cheena*, which are distinguished as monthly worms. Were they not specifically distinct, why do not the annuals when cultivated in Bengal become monthly, like the others? or, again, why do not the monthlies become annuals in the North? By their not undergoing these changes we are furnished with proof that it is not a change of climate which makes the alteration, but that nature has stamped them with distinctive characters and habits.

We have all read or heard of complaints in regard to the uncertain quality of the silk sent as that of *Bombyx Mori* to Europe from Bengal, and that it is on that account held in less estimation than silks from other countries. This variation in quality arises from the cultivation of these several distinct species under the name of *B. Mori*, precisely as all Eria silks were supposed to be derived from *Attacus Cynthia*. These worms being of different sizes and always much smaller than the larvæ of *B. Mori* (which species by the way is not cultivated at all in Bengal), must necessarily produce a silken fibre of far greater fineness than it; from which it results that not only is the reeled silk much finer than that of the true *B. Mori*, but each Bengal worm differs from the other in the thickness of its fibre, and as all goes home nominally as the produce of the same worm, no wonder that an outcry is raised about the uncertain thickness of the fibre.

This discovery of several distinct species confounded under the name of *B. Mori*, although admitted by competent judges in Europe, has in India been sneered at, and the differences percep-

tible in the size, colour, markings and habits of the worms, and the form and texture of the cocoons, have been attributed to the effects of climate only. Climate, however, has no such influence, since we find each species, in whatever climate cultivated, preserving the very same characteristics. If the differences at present perceptible were in reality merely the effects of climate and of peculiar treatment, we might surely expect that when a change of climate and treatment was experienced some marked and decided change would soon be perceptible in the insects likewise; but this is not the case, each retaining at Mussooree, in Oudh, and elsewhere in the Northern Provinces, the very same characteristics as when in the damp warm plains of Bengal. The characters, in fact, are constant, no matter where the insects may be.

Characters, whether of form, colour or habits, if permanent and unchangeable, are to all intents and purposes specific characters, and even Mr. Darwin admits that when one of his supposed varieties attains to a certain degree of stability, it assumes, *pro tem.*, the value and importance of a species until variation again commences at some after period among the offspring.

Under any circumstances, therefore, these insects, whatever they may originally have been, having now severally attained to permanency of characters, have become true species, and as such must be accepted and described.

Genus Bombyx, Schranck.

The genus *Bombyx* appears naturally to divide itself into two well-defined sections or sub-divisions, the first comprising all the domesticated Chinese species of which the larvæ have hitherto been known to cultivators and men of science as being of a pale creamy-white colour, and furnished only with one fleshy or semi-horny sharp-pointed spine, springing from the dorsal centre of the penultimate segment; the other containing the wild and uncultivated species, whose larvæ are not only richly variegated with a number of bright colours intimately mixed together, such as ashy-grey, livid-green, yellow, rufous, ferruginous and black, but are likewise furnished with from four to six longitudinally-disposed rows of fleshy or semi-horny spines, all curving backwards, besides one long one on the penultimate segment, placed between the two dorsal rows and pointing in the opposite direction.

Of the insects contained in this last section, one feeds on the wild indigenous mulberry tree of the North-Western Himalaya, and yields a first-rate silk, which, however, cannot be turned to

much account, as the worm is too intractable to submit to domestication, and can only be reared upon the trees in the open air, which of course renders the crop precarious, through the incessant attacks of birds and insects. This species was discovered by myself at Simla in 1837, but, owing to illness and the subsequent breaking out of the Afghan war, was not sent to Europe until 1842, when the moth was figured by Mr. Westwood in "The Cabinet of Oriental Entomology," under the name of *Bombyx Huttoni*.

A second species occurs sparingly in Bengal, in the neighbourhood of Calcutta, where it feeds on the leaves of the *Artocarpus lacoocha*, and to which I have assigned the name of *Bombyx Bengalensis*.

At Singapore, or in its neighbourhood, is a third species, called by Mr. Walker *Bombyx subnotata*, though nothing more than its existence appears to be known.

A fourth species is found in Assam, where it feeds on the leaves of the *Ficus religiosa* or Peepul tree, and is distinguished as the *Bombyx religiosæ* of Helfer.

And lastly, so far as continental India is concerned, the *Bombyx lugubris* of Drury is said to occur at Madras, though the statement appears to require confirmation, and Mr. Moore even doubts its being a *Bombyx* at all.

These two sections of the genus *Bombyx* being remarkable for the presence in the one, and the absence in the other, of bright colours and rows of spines in the larvæ, led me to entertain a suspicion that the Chinese domesticated species are no longer in their original condition; and following up this idea by a series of experiments, I soon discovered that with respect to colouring, the *Bombyx Mori*, and one or two others, when partially reverted to a state of nature, show a great and marked approach in the distribution and arrangement of their colours to the wild species of India.

Besides the genus *Bombyx*, this group of the family contains the genera *Ocinara* of Walker, and *Trilocha* of Moore; of the former I have discovered two, if not three, new species, and I understand that others have been discovered in Bengal. In the larva state this genus, although showing alliance with *Bombyx*, appears likewise to approach the *Geometræ*, the caterpillar generally having, not only something of the manner of the latter, but possessing also several of those curious little excrescences which give a Geometer the appearance of a dry stick with withered buds. The larvæ of *Ocinara* spin a small neat cocoon resembling

that of some of the smaller *Bombyces*, but there is not silk enough to render them worth cultivating. The larva of one of my Mussooree species, unlike the others, is hairy.

Before proceeding further it may be well to observe that in France and Italy, where none but annuals can be cultivated, the same degree of uncertainty as to species appears to prevail; *four varieties* of *Bombyx Mori* are there distinguished from each other as follows:—

First. The small silkworm of three casts or moults.

Second. The large silkworm of four moults.

Third. The common white silkworm of four moults.

Fourth. The common yellowish silkworm of four moults.

The eggs of the first of these are said to weigh one-eleventh less than those of the common silkworm; that is to say, that while 39,168 of the latter weigh an ounce, it requires for the same weight 42,620 of the smaller one. The worms and cocoons are also said by Count Dandolo to be two-fifths smaller than those of the common sort. "The cocoons, also," he says, "are composed of finer and more beautiful silk, whence it would appear that the silk-drawing tubes are finer in these silkworms." The cocoons are better constructed, and afford in proportion, at equal weight, a greater quantity of silk. The worms, likewise, come to maturity four days earlier than the common sort. Six hundred cocoons weigh 1½lbs. In the south of France, according to M. Boitard, this race is known as the Milanese worm, being common in Lombardy.

With regard to the second variety we are told that it is cultivated chiefly "dans le Frioul." The difference in the weight of the eggs between this and the common sort, or fourth variety, is given as one-fiftieth only, that is to say, 39,168 eggs of the latter go to the ounce against 37,440 of the former, which are thus the heavier. One hundred and fifty cocoons weigh a pound and a half, while 360 of the common sort make the same weight. This variety requires five or six days longer to bring it to maturity.

The third variety is said to have been imported from China by the inhabitants of the "*arrondissement d'Alais*," and is common both in France and Italy; it differs from the others in constantly producing white cocoons, the silk of which is said to be finer than that of the common sort.

The fourth variety, which appears to have been selected as the standard of comparison, is the commonest of all and is cultivated

generally in France and throughout Europe. The cocoon is a yellow of different degrees of intensity.

Now the question arises—Are these to be considered as merely local and climatal varieties of *B. Mori*, or can any of them be regarded as true and distinct species?

With regard to No. 1, it is said that although in Italy nine out of ten cocoons are white, yet that in France the majority are yellow. No stress, therefore, can be laid upon the colour of the silk as a specific character, but a valid mark of distinction would (if there is no mistake) appear to exist in the fact of the worm undergoing only three moults instead of four as in all the others.

That this worm, however, is not in a healthy state is clearly to be seen in the change produced on the colour of the silk by change of climate, the heat of Italy producing white, and the cooler and more natural temperature of France producing yellow cocoons. But if this worm be a mere variety of *B. Mori* induced by climate, Count Dandolo's remark that the greater fineness of the silk is attributable to greater fineness in the silk-drawing tubes, at once proclaims the unhealthiness and degeneracy of the worm, which has dwindled down from its natural size and is no longer able to yield a fibre of the original thickness. If then this is a mere climatal variety of *B. Mori*, the peculiarities in its moulting, and the changeable colour and fineness of the silk, can be attributed to nothing else than loss of size and constitution.

If climate has been the agent by which this variation has been brought about, how is it that the entire race of *B. Mori* has not been affected in a similar manner? Yet in Italy, in France and in other countries of Europe, *B. Mori* still continues not only to hold its ground side by side with this supposed variety, but is in spite of climate stated to be still the commonest of all.

An Indian sericulturist rising from the perusal of Reports on the Culture of Silk in various parts of the country, will find perhaps that no two of these agree in the length of time consumed between the hatching of the egg and the spinning of the cocoon. The explanation is, that the reports do not all apply to the same species, for at Madras and in Bengal proper, the true *B. Mori* is nowhere found, and it has only very recently been tried, and with no very encouraging success, in the North Western Provinces of Upper India. But the time that elapses between the hatching of the egg and the spinning of the cocoon will vary even in the same species, according to the temperature in which the worm has been reared, and likewise, in some measure, accord-

ing to the health of the insect. As a rule, the whole process will be more rapid in a high temperature than in a colder one, and it is to be observed that the longer the time consumed, the better in general will be the cocoon, for the simple reason that the worm has had ample time to come to maturity, whereas when the growth is forced and accelerated by high temperature, although the worm may grow to a goodly size, it will still have passed through its different stages so rapidly as materially to diminish the quantity of silk-gum, which it has not had time to secrete. The cocoon will, consequently, be less stuffed with silk than when, all other things being equal, a longer time has been consumed. Count Dandolo lays it down that thirty-two days elapse between the hatching of the egg and the formation of the cocoon, and he adds four days more for the completion of it, or thirty-six days in all. This likewise is the time given by M. Boitard as applicable to the worm in France. Dewhurst informs us that in England forty-six days are consumed. In China, according to published accounts, the time varies greatly, being from twenty-three to twenty-eight and sometimes forty days, with an additional seven days allowed for the cocoon, so that we have thirty, thirty-five and forty-seven days given as the time. Contrary to all experience also, it is said that *the shorter* the time consumed, *the more abundant* will be the crop of silk, twenty-three to twenty-five days producing twenty-five ounces of silk from one dram's weight of newly-hatched worms; twenty-eight days yielding only twenty ounces, and thirty to forty days producing no more than ten ounces. This is clearly an absurdity, for it shows that the longer the worm continues to secrete gum, the less silk will it produce. Dr. Anderson, as quoted by Dewhurst, says that in Madras twenty-two days only are required; while Mr. Cope of Umritsir gives twenty-eight to forty days, but whether for the Punjab or elsewhere is not stated. At Mussooree I have found the time consumed by *B. Mori* to run from forty-six to forty-eight days. At Lucknow in Oudh, Dr. Bonavia gives "about forty-six days" for *B. Mori*, and seventeen for the small Chinese monthly worm in the month of June, and fifty-one days in November.

It is evident that these statements cannot all apply to the same species. In France and in Italy, in England, Oudh, the Punjab and Mussooree, the reference is to the annual *Bombyx Mori*, known in Europe as "The common silk worm of four moults," and in India as the Cashmere or Bokhara worm.

The time, therefore, consumed by *B. Mori* in France and Italy is about thirty-six days; in England, Oudh, Punjab and Mussooree about forty-six days.

Mr. Cope, in a Lecture on Silk delivered at Lahore, gives (as before mentioned) from twenty-eight to forty days as the time consumed. If *B. Mori* spins its cocoon in twenty-eight days from the time of hatching, a stronger proof of the total unfitness of the Punjab climate for the culture of that species could not be furnished. The fact, however, is that the time laid down in the lecture cannot satisfactorily be applied to any species in particular, but evidently includes more than one.

The Chinese account likewise would appear to have reference to more than one species, while in Madras, the species referred to by Dr. Anderson was in all probability one of the three monthly worms, because the true *B. Mori* is nowhere cultivated below the North Western Provinces.

The true time consumed from the hatching of the worm to the completion of the cocoon would, consequently, appear to range from thirty-six to forty-six days, and the more rapid progress made in Europe is probably to be attributed to the fact of the worms being shut up in rooms with a temperature of 68° to 77°, which is altered after every change of skin. Thus, Dewhurst says, "75° is the degree of heat they should be kept in until the first casting or moulting; between 73° and 75° until the second moulting; between 71° and 73° until the third; and lastly, between 68° and 71° until the fourth moulting."

From this statement we perceive that, according to this writer, the temperature should be reduced as the worm advances to maturity, a procedure which is diametrically the reverse of that pursued by nature.

According to the same authority "it has been proved by a series of experiments that in France 68° is the heat most suitable to silkworms; some cultivators have raised it as high as 77° with good success, while M. Boisseur de Sauvages has even gone as high as 100°."

At Mussooree I have always reared the worms in an open room, so that, as the external temperature varied, that of the interior varied likewise, and the air was always fresh and natural. The eggs hatched spontaneously in a mean temperature of 64°, and the thermometer never rose beyond 68° up to the time of spinning the cocoon. During the same time the daily mean of the external temperature ranged from 47° to 66°, so that the French view of the matter is thus proved to be the most correct. I have shown, moreover, (*ante*, p. 152,) that I found great difficulty in checking the hatching of the eggs even in a temperature of 53°, and only did so at last by placing them out all night in the frosty air of December, at an elevation of 5,400 feet.

The small Chinese monthly worm (*B. Sinensis*) required in the month of June, in the warm climate of Oudh, no more than seventeen days from the hatching of the egg till the formation of the cocoon, while, in the cooler temperature of November, fifty-one days were consumed. At Mussooree, the same species, hatched on the 26th of June, spun the cocoons in twenty-eight days; while the *Boro-pooloo* (*B. textor*), which was hatched on the 14th of March, began to spin on the 28th of April, consuming thus forty-six days, or the same as *B. Mori*.

This circumstance, together with the similarity in the marking, and the occurrence of black worms in the brood, has led Dr. Bonavia somewhat hastily to conclude that the Cashmere worm and the Boro-pooloo are one and the same species, an error into which he could scarcely have fallen had he given due weight to the fact that not only is the worm a full inch shorter than that of the Cashmere worm, but the size, colour and texture of the cocoons are all totally distinct, and no naturalist could ever confound the one with the other. These differences, moreover, are permanent, even where the species are cultivated together, and the occurrence of black worms merely shows that the Boro-pooloo, like *B. Mori*, has completely lost its constitution. Black worms are also occasionally found in the broods of the *Nistry* (*B. Cræsi*), which is undoubtedly distinct.

If, then, we unite all the species under the one name of *Bombyx Mori*, we shall find that the time consumed from the hatching of the egg to the spinning of the cocoon will vary in the same climate from seventeen to forty-six days, a circumstance which is alone sufficient to point out the incorrectness of such an arrangement: while if we more reasonably insist upon there being several distinct species now confounded together, the difficulty at once vanishes, and the difference at present observable is satisfactorily accounted for.

I shall, therefore, now proceed to unfold my views on this subject, and show, from the peculiarities observable in each species, upon what grounds I insist upon specific distinction.

1. Bombyx Mori, Linn.

Synonymes.

Phalæna Bombyx Mori, Linn. S. N. 1, 2, p. 817 (1767); Amœn. Acad. iv. p. 563; Faun. Suec. p. 832; Aldrov. Ins. p. 280; Albin. Ins. pl. 12, f. 16; Reaum. Ins. ii. p. 5, f. 2; Rœsel. Ins. iii. pl. 78.

Bombyx Mori . . Fab. Spec. Ins. ii. p. 180; Mant. Ins. ii. p. 114; Ent. Syst. iii. 1, p. 431; God. Lep. de France, iv. p. 153, pl. 14, f. 3, 4; Walker, List Lep. Het. Brit. Mus. pt. 6, p. 1505; Moore, Cat. Lep. Mus. Ind. House, ii. p. 374.

Sericaria Mori . . Blanchard, Gay, Hist. de Chile, Zool. vii. p. 55.

Lasiocampa Mori . Schranck.

Lasiocampe du Murier Boitard, p. 148.

The common domesticated Chinese silkworm of Europe.

Habitat.—Originally the northern mountainous provinces of China, especially that of Tche-kiang; now domesticated in China generally, in Cashmere, Afghanistan, Bokhara, Persia, Syria, France, Italy, Spain, Sweden, Russia, &c., and recently introduced into Oudh and the Punjab.

The species termed by the late Dr. Royle "*Pat major*" refers not to this, but to the Bengal Annual known as *Boro-pooloo*, while that mentioned by Dr. Helfer in the J. A. S. B. vi. p. 41, as cited in Mr. F. Moore's "*Synopsis*," probably refers to one of the monthly worms which have hitherto passed under the name of *B. Mori*, a species which, at the time when the Doctor wrote, was confined to Cashmere, and was certainly not cultivated in any part of Bengal or the Lowland Provinces.

The word "*Pat*" appears to be used as a generic term.

Larva.—Originally from the Northern parts of China, the worm of *Bombyx Mori* is now extensively cultivated for its silk, in various countries both of Asia and of Europe, and everywhere thrives best where the temperature is moderate. It is the largest and the strongest of the domesticated species, and is an annual, producing naturally but one crop of silk in the year, although in certain temperatures it is possible to make it produce a second crop.

When first excluded from the egg the young caterpillar is hairy and of a dark-brown colour, the edge of the anterior segment being ashy white; the head and prolegs are shining jet black.

In the course of four or five days the five anterior segments become slightly swollen, exhibiting a mottled appearance of brown dots and small patches on a livid ashy ground, and previous to the first moult these segments become altogether livid ashy, while the others are of a pale brown; there is one short tubercle or spine on the middle line of the penultimate segment, and the hairy ap-

pearance of the young worms is owing to short tufts of hairs springing from rows of rudimentary tubercles as in the wild and uncultivated kinds. These, however, all disappear, with the exception of the anal spine, after the first moult.

In the second stage, the four anterior segments are of an ashy white, the dorsal portion of the second and third segments being swollen and wrinkled; the remaining segments are pale brindled, or mottled grey, with a slightly mealy aspect; a short, blunt, somewhat flat-sided, semi-horny tubercle on the dorsal centre of the penultimate segment, and having generally a faint tinge of orange; on the fifth segment are two faint semilunar brown marks like inverted commas, and on the eighth segment are two small round spots of brown; head and prolegs black.

After the second moult the insect becomes altogether of an ashy or creamy whiteness, the second and third segments still more swollen and wrinkled; on the front of the second segment is a thin longitudinally disposed dark line with generally a small dark spot on each side of it; two dark semilunar marks on the back of the fifth segment, and the dark spots on the eighth slightly raised; anal horn pointed and somewhat suddenly attenuated, with an inclination to point backwards; head mealy grey-brown, and small as compared with the rapidly increasing size of the body.

In the two following stages there is usually no alteration, except that the length and thickness of the worm rapidly increase, and that the markings become more conspicuous, that on the fifth segment often assuming the form of a crown. The feet are fringed with minute cilia. The entire body is without hairs and quite smooth; the stigmata or breathing apertures along the sides are small, round and dark, and in the last stage of growth the two dots on the front of the second segment increase in size and are partially rufous. The length of a full grown worm, cultivated at Mussooree, is from 3 to 3¼ inches.

Such is the appearance of the worm as now cultivated (Pl. XIX. fig. 8), but in almost every batch of worms there will be seen after the first moult has occurred, some dark-coloured ones which at the first glance appear to be a distinct species. By the French these worms are regarded as a mere evanescent variety and are distinguished as "*vers tigrés*" and "*vers zébrés*;" so far, however, are they from being a mere passing variety that they are actually types of the original species, and merely require to be treated according to the established rules of breeding in order to render them permanent and healthy.

The Black Worm. (Pl. XIX. fig. 7.)—When first hatched the caterpillars are in all respects similar to those of the pale variety, and it is not until after the first, and sometimes second, moult has taken place that any difference is perceptible; then, however, instead of having the four anterior segments of a creamy-white, the whole body is of a dark-brindled or mottled-grey colour, with the exception of an ashy band or broad stripe, which, crossing in front of the anterior segment, runs round on each side as far back as the middle of the fifth segment, widening up towards the back, but leaving a dark-brindled dorsal space between them; at a later stage, when the worm is near maturity, this ashy band becomes less clear and bright, and is often tinged faintly with clay colour, or even with a fleshy roseate hue; on the fifth segment the two dark lunules are well defined, and have an ashy patch between them; the dark spots on the eighth segment are sometimes wanting, as they are also in the white variety.

In the third and fourth stages the colouring generally becomes very dark, in some intensely so, and takes the form of a net or trellis-work spread over an ashy-grey ground. As the worm approaches the spinning time the colours again become fainter, and often assume a grey sandy-brown hue overlaid by the dark network. The anterior portion of the second segment rises somewhat abruptly, and from it, through the dorsal centre of the first, runs a narrow black longitudinal line, on each side of which, on the second segment, is a round black spot, perpendicularly divided by a pale orange line, causing the appearance, as it were, of two eyes.

Such is the appearance in the first year of the separation from the white worm; the differences in after years, of course, become more marked, though the general character is the same.

After two or three years of separation and restricted interbreeding the appearance, especially in the middle stages, is very dark indeed, and the whole insect looks as if overlaid by a well-distended net, the meshes of which are open and well defined; it is, indeed, this well-defined marking, together with the ashy lateral band along the anterior segments, which makes the species approximate to the wild races, the lateral band more especially being a characteristic of the wild worms.

Progress of the Experiment.—In the previous part of this paper (*ante*, pp. 149—153) I have shown the result of my experiments up to the end of 1863. I now proceed to show the condition of

the worm in the spring of 1864, when the eggs deposited in the spring and autumn of the past year began to hatch on the 21st of March in a temperature of 65°.

First, then, with regard to the white worms, it was observed that, although for two years running the black worms had been all weeded out from them, yet the per-centage of dark worms was far greater than before; showing thus, according to the experience of cultivators, a great accession of strength and health; great numbers of the eggs likewise adhered firmly to the paper on which they were deposited, instead of being loosely scattered as heretofore, but the white worms have never yet produced a second crop. This variety, though far from being in the best health, showed no increase of degeneracy over previous years.

With regard to the black worms, they hatched on the same day with the others, although some had been deposited in spring and others in the autumn of 1863. All were decidedly unhealthy, although those from the autumn batch were far less so than those of spring, the latter being so terribly affected with jaundice, and with some disease that turned the worm dull green, that I was compelled to throw the whole away. The worms from the autumnal batch went on well enough and spun good cocoons, the moths from which deposited a goodly number of eggs in the end of May, and these began to hatch for a second crop in September, 1864. They are apparently healthy, and from a few of their eggs I shall carry on an experiment for amusement, but I feel fully persuaded now, after several years of observation, that the constitution of the worm has been so thoroughly undermined that, although we may be able to restore it to its natural appearance, it will never be able thoroughly to shake off the various diseases to which it has so long been subject. The only way open to the sericulturist is, therefore, to re-seek in the original habitat in China for the wild worms in their natural state of freedom on the trees, and should any of these be procurable, then may the entire stock in Europe be gradually renewed, and the present impending ruin be averted.

Dr. Bonavia of Lucknow, the active and enterprising secretary to the Agri-Horticultural Society of that province, having in the spring of 1864 furnished me with a few eggs obtained from Marseilles, I proceeded to ascertain whether they differed from the Cashmere worm or not.

These began to hatch, in a temperature of 67°, on the 4th of April, when the Cashmere worms were already fifteen days old; in the batch were a few of the dark coloured ones, but none,

whether dark or white, appeared to be healthy; still they were not worse than their congeners, and eventually spun better cocoons, being, although not so large, much more stuffed with silk. Between these worms and those from Cashmere stock there is not a shade of difference, both being *B. Mori*.

Imago.—In the moth the ground colour of the wings is a dull ashy white; sometimes they are entirely ashy, without any lines or other markings, while some have only two short parallel lines on the fore-wings near the centre of the costal margin. In others there are lines as below described, but no colours. These are from the white worm as now cultivated.

The appearance of moths produced from black worms approximates more to the wild *B. Huttoni*, both in colour and in markings.

In these the ground of the wings is still ashy, and the male, as usual, is smaller than the female, having the shaft of the antennæ white, with dusky black plumes; eyes black; body and ground of wings ashy-white, suffused with a pale brown tinge; near the basal angle of the fore-wing are two parallel lunate lines, the horns of which point inwards and rest upon the anterior and posterior margins; between these lines darkish brown, in some instances blending them into a brown band, in others the lines are clear and distinct; about the middle of the costal margin, at a little distance within the wing, are two very short parallel lines slightly curved in the opposite direction to the basal ones; these, however, are sometimes absent; across the wing, from the anterior to the posterior margin, are two partially parallel submarginal lines at a little distance apart, the inner one being a slight curve and the outer one taking a bend or lunate sweep near the exterior and posterior angle; these lines are sometimes distinct and clear on the ashy ground, at others they are blended into a dark-brown band by the deep suffusion of the space between them. Fore-wing strongly falcate in both sexes; the hind-wing is rounded on the exterior margin; abdominal margin folded down as in *Ocinara*, with one blackish spot about the middle; from the anterior to the abdominal margin are two subparallel lines through the disc of the wing, curving parallel to the outer margin, sometimes distinct, at others blended by the suffusion of the inclosed space with brown. The female is much the same, but there is in both sexes the greatest variety in the markings, which is, I think, a clear indication that the insect is not in a natural condition or sound state of health. The under-side dull ashy, with the dark lines and bands visible, as above. The male often exhibits ashy wings, with brown bands,

and the body dark grey. Expanse of wings in the female 2 inches; in the male 1⅝ inches, although the size varies as much as the colouring.

2. Bombyx textor, Hutton.

Syn. *Bombyx Mori* of Indian sericulturists.

The *Boro-pooloo* of Bengal; "*Pat major*" of Royle.

This species, hitherto confounded with the preceding, is said to have been introduced from China, where it is still cultivated, under the name of the *white cocoon*, but the time of its introduction into India appears to have been forgotten.

In Bengal, as well as in its native country, it is an annual, hatching early in the spring, usually in January, yielding generally pure white cocoons, far inferior in size to those of *B. Mori*, and altogether of a different shape, character and texture, having an inclination to become pointed at each end, and with the silk not closely interwoven, but externally somewhat flossy and loose, whereas the cocoons of *B. Mori* are closely woven, compact, hard and smooth, ovate in shape, and four or five times larger; some that I have received from France being little inferior in size to those of the Tussur moth (*Antheræa Paphia*).

The worm, when mature, bears a strong resemblance to that of the preceding species, but is much smaller both in length and thickness, and, as a strong mark of distinction, it may be observed that it preserves all its characteristics unchanged, even when cultivated in the same climate and in the same manner as *B. Mori*, neither of the species exhibiting the slightest indication of adopting the peculiarities of the other.

In Dr. Bonavia's Report on Sericulture in Oudh for 1864, he remarks of *B. textor*,—"I cannot find any reason to believe that this worm belongs to a different stock from the Cashmere and Bokhara worms;" others have said the same thing, which only proves to me that they have never looked beyond the worm itself, since had they done so they might have found, as I have done, abundant proofs of specific distinctness.

The same gentleman proceeds to inform us that—"Captain Hutton favoured me with a small quantity of eggs of his selected dark-coloured worms. According to his views the dark-coloured variety approaches more to the wild kind, and therefore has more healthy blood in it than the white variety, which he considers as a degeneration of the original worm. It is strange though that the 'Boro-pooloo,' which has been reared in Bengal for a long

time, contains a large number of the dark variety. One would be inclined to think that, considering the bad mode of rearing and the climate of Bengal, it would have degenerated into the white variety by this time, according to Captain Hutton's theory."

The writer, however, shows, by the admission that "a large number of the dark variety" occurs amongst the Boro-pooloo worms, that "Captain Hutton's theory" actually does hold good. Just as with the originally dark-coloured worms of *B. Mori*, so also the originally dark-coloured worms of *B. textor* "have degerated into the white variey." The occurrence of these dark worms, as I have pointed out (*ante*, pp. 148 *et seq.*), is due to an effort on the part of nature to return to the original stock, from the sickly degenerated state into which the species have fallen.

Again we are told that, "the selected dark-coloured worm of Mussooree did very well, but I could not detect any difference between the cocoons of these and those of the white Cashmere ones. I selected many of the black ones of the Cashmere, Bokhara and 'Boro-pooloo,' and kept them separate, but did not find that they produced better cocoons than the rest, and they all had one disadvantage, that is, on account of their colour, it was not easy to discover when they were ready to spin."

Be it observed, however, that in furnishing these dark-coloured worms, I did not guarantee the same results in Oudh as are obtainable in the European climate of Mussooree. I should not have been at all surprised to hear, considering the heat of Oudh and the inexperience of the conductor of the experiments, that every worm had returned to a state of sickly whiteness. As to the difficulty of discovering when they were ready to spin, this could only have occurred to an unpractised eye, since there is always a semi-transparent yellowish waxy hue about a mature worm that is quite unmistakeable to an experienced eye.

According to Mr. C. Blechynden and Mr. Bashford, this species is the one that in Bengal is recognized as "*The Italian Stock*;" in which case it would appear to be identical with that which in France is termed "*The Milanese worm*," though if such be the case, how are we to account for its only undergoing three moults in France and Italy, while in India it invariably has four, like all the others? I incline very strongly to the belief that this alleged peculiarity is altogether fabulous.

In Bengal, according to Mr. C. Blechynden and others, the worm is also sometimes dark coloured like those of *B. Mori*, thus showing clearly that it is not in its original healthy state; the

worms attain a length varying from 2 to 2½ inches, as is the case also at Mussooree.

As regards the colour of the silk, nothing could more strongly support my view that white is a sign of weakness and degeneracy. In Italy, we are informed, there are generally nine white cocoons in every ten,—but when cultivated in France bright golden yellow is the predominant colour; this is undoubtedly an effect of climate, showing that the warmth of Italy is less adapted to the health of the insect than the cooler temperature of France, which in some districts is nearly the same as that of Mussooree, where precisely similar results have been observed. The eggs of this species, hatched in March, 1864, from the deposit of May, 1863, gave seventy-eight black to thirty-one white worms, in a batch of 109, whereas in 1863 eggs procured from Bengal produced white worms without a single exception. The cocoons spun in 1863 by the Bengal worms were all white, with the exception of about half a dozen, whereas in 1864 there was not one white cocoon, all being of a bright golden yellow. In China, as in Bengal, the usual colour is white, with an exceptional sprinkling of yellow cocoons. Here we have the effect of climate distinctly marked, and showing that while a high temperature produces both white worms and white silk, a temperate climate, by imparting strength, produces dark worms and yellow cocoons.

The worm which in France gives permanently a white cocoon, and which was imported from China into the "*arrondissement d'Alais*," would appear to be distinct both from *B. textor* and the other two varieties; so that if No. 1, or the Milanese worm, be our *Boro-pooloo*, as I suspect is the case, and Nos. 2 and 4 are true *B. Mori*, then No. 3, with the permanent white silk, is in all probability a distinct species.

The changes in the appearance of the caterpillars of *B. textor* are precisely similar to those observable in *B. Mori*, and need not be repeated; when first hatched, the worms of *B. textor* are rather black than brown, and although in the after stages there is in the colouring and marking of the two species no really tangible and well-defined distinction, yet at the same time there is to the eye a perceptible difference in the shade of colouring, which is darker, more *prononcé*, more equally diffused, and more of a neutral tint in *B. textor* than in *B. Mori*; the latter, besides attaining to a far larger size and forming a totally different cocoon, has the dark parts less purplish and not so generally diffused. These remarks, however, pertain to the black worms only; the white ones differ in no respect except in size.

Having now disposed of the Annuals, we have to consider the question of distinction with regard to what are commonly termed "Monthly worms."

3. Bombyx Crœsi, Hutton.

Syn. *Bombyx Mori*, var., of Indian sericulturists.
The "*Nistry*," and "*Madrassee*" worm of Bengal.

This is a much smaller species than either of the preceding, yielding seven or eight crops of silk in the year; the cocoon is small, of a beautiful bright yellow colour, and of a somewhat loose and flossy texture. It is said to thrive best in the summer months from June to October, and at other times is only kept up to preserve the stock. In hot weather it goes through all its changes from the egg to the cocoon in twenty-five days, but in the colder months it occupies thirty-five days. The worm is from $1\frac{1}{2}$ to 2 inches long, and is of a clear silvery or pearly hue, having a moist dewy appearance. The anal spine is short and truncated, and the dark lunar marks, which are so conspicuous on the fifth and eighth segments of the two annuals, are in this species wholly wanting. It is said never to yield white cocoons, but that dark worms occasionally appear in the brood. I suspect this to be the "*Pat minor*" of Helfer and Royle.

4. Bombyx fortunatus, Hutton.

Syn. *Bombyx Mori*, var., of Indian sericulturists.
The "*Dasee*" worm of Bengal. (Pl. XIX. fig. 3.)

This is the smallest species of the whole, and is said to be hardy, but the yield of silk is uncertain; there are no dark worms among them, and they thrive best in the cold season, occupying at that time from the egg to the cocoon about forty days, but in hot weather only thirty-three days.

The silk is of a golden yellow, and the cocoon small; it resembles that of *B. Crœsi* in form and texture. When near maturity there is a very marked and perceptible difference between this species and all the others, the worm being of a bluish leaden-grey throughout; the ocelli or lunate marks on the fifth and eighth segments are wanting, as in the last; the anterior segments are slightly intumescent and wrinkled; a short pale spine on the penultimate segment. The eggs are small, and pale straw colour, remaining so until within a day or two of hatching, when they become leaden-grey.

5. Bombyx Arracanensis, Hutton.

Syn. *Bombyx Mori*, var., of Indian sericulturists.
The *Arracan* worm.

When first hatched, the Arracan worm is very small; of a pale sandy-brown colour, and hairy, like all the others; anterior edge of the first segment whitish, or livid ash; head black.

I succeeded only once, many years ago, in obtaining a few eggs of this species, through the kindness of Mr. Blechynden, secretary to the Agri-Horticultural Society of India, a gentleman whom I have uniformly found ready to assist in every useful inquiry. The worms produced from these eggs were very feeble, and, refusing to feed, were all dead by the evening.

The cocoon is said to be larger than those of the Bengal monthly worms, and the silk strong and good.

The worm is supposed to have been introduced from Burmah.

6. Bombyx Sinensis, Hutton.

Syn. *Bombyx Mori*, var., of Indian sericulturists.
The small Chinese monthly worm.
"Sina" and "Cheena" of the Bengalis.

The worm of this prolific species is considerably smaller than that of *B. textor*, and the cocoon partakes much of the same characters, being sometimes white and sometimes bright yellow, with occasional cocoons of a beautiful faint greenish-white. The markings of the mature insect are very different from those of the *Boro-pooloo*, and from all the others.

Eggs received from Bengal began to hatch on the 26th of June; head and pro-legs jet black and shining: the body hairy and pale brown, with minute anal horn.

On the 30th of June these worms moulted, the head and pro-legs being black as at first; the four anterior segments pale ashy, the second and third gibbous and wrinkled; the remainder mottled ashy-grey; a short blunt conical spine on the penultimate segment. There are also two longitudinal dorsal rows of minute round black dots, four on each segment, and giving out minute hairs; on the fifth segment are two semi-lunar brown marks, the horns of which point inwards, as in *B. Mori;* the anal tubercle with a few short cilia at the summit, and behind this, on the anal segment, are two minute tubercles placed close together like the sights on a gun, and behind them again lower down, and on the anal shield or valve, are two others; stigmata black.

After the second moult, the appearance is much the same, the head and pro-legs being black; the four anterior segments ashy; remainder mottled iron-grey; stigmata black; lunules as before on fifth segment, and two small black dots on the front of the second segment.

On the 9th of July the third moult was completed, the head having changed to ashy-white; the body entirely ash-coloured; two small black dots in front of the second segment, and two on the posterior part of the third; two lunules or sickle-shaped dark marks on the fifth segment, composed of two narrow dark curves enclosing one of ash; on the eighth segment are two small brown circular spots; in other respects as before, and still very small; stigmata a black ring with white centre.

On the 15th July the fourth moult was completed, the worm being of a faint waxy colour with grey-brown head; the two dots on the front of the second segment now give place to a transverse bar with a dot at each end. Two dorsal and two lateral rows of small tubercular brown dots. The marks on the fifth and eighth segments as before, but darker and more conspicuous; stigmata a black ring with white centre. After the fourth moult the worm increases rapidly, and finally attains the length of $2\frac{3}{10}$ inches.

On the 22nd July they began to spin, and the cocoons were generally of a fine bright golden-yellow, although white cocoons were far from uncommon. The form and loose flossy texture of the cocoon is the same as that of the *Boro-pooloo*, but those of the latter are larger. In the spinning of the cocoon there was an immense waste of silk, arising, I suspect, from some unhealthiness, as the worms were restless and wandering, beginning a cocoon in one place, and then leaving it to seek a fresh spot, which was perhaps in turn abandoned, until sometimes all the silk was thus frittered away, and the worm either died or became a naked pupa.

On the 4th of August the moths began to issue from the cocoons, and coupled; they were very small and altogether ashy-white, without any markings on the wings.

The moths showed the presence of disease in having black inky spots upon the wings and beneath the skin of the abdomen at the junction of the segments; still they coupled freely and laid a plentiful supply of eggs, which were at first nearly white, but changed to pale yellow in the course of a few hours.

The coupling continued for about ten hours, when they voluntarily separated. The males appeared to be somewhat sluggish, and the females in most cases, after the first coupling, would not permit a second.

On the 16th of August the eggs, although still of a pale straw-colour, became somewhat dusky and exhibited the black head of the young caterpillar within the shell.

On the 17th these eggs had become grey and of good colour. On the 18th they all hatched in a swarm, and I found that, unlike *B. Mori*, which ceases to hatch about midday, these continued to come forth during the entire day and night, until all were excluded.

When first hatched they are about $\frac{1}{10}$ of an inch long; and after the first moult $\frac{3}{10}$ inch; after the second moult $\frac{8}{10}$ inch; after the third moult $1\frac{3}{10}$ inch; and at maturity just before spinning $2\frac{3}{10}$ inches.

I observed a curious fact with regard to some of these eggs that were laid on the 5th of August,—about 20 of them turned vinaceous on the 10th, while all the rest of the brood remained *in statu quo*. These coloured eggs were not scattered about among the others, but formed a small group by themselves. They did not hatch with the others, but remained in the same vinaceous state until the 3rd of October, by which time the others were again laying eggs. Yet I could perceive no difference in the worms afterwards, although there had been an interval of 30 days between the hatching of the two parties laid on the same day.

This species continued to yield crop after crop even up to the middle of December, when many of the cocoons remained dormant, while others yielded moths which laid eggs that remained unhatched, the weather being very cold and variable, and no leaves remaining on the mulberry trees. Here I think we have a clear proof that at least this monthly worm could never have inhabited a northern climate, but must by nature be entirely restricted to warm lowland regions in which mulberry leaves are procurable all the year round.

It appears from some remarks of Mr. C. Blechynden that it was to this species and not to the Nistry (*B. Crœsi*) that allusion was made in Young's Magazine of Agriculture, as quoted by Kirby and Spence, and the same gentleman observes that the name given to the species by the natives is "*Sina*" or Chinese. He remarks as follows:—"The worm mentioned by Kirby and Spence does exist and is known as '*The China worm*;' it goes through all its changes from egg to cocoon in twenty-two days; so it is nothing strange to have new progeny in a month. The period may be shortened by two or three days if the room occupied as a rearing-room is kept at a high temperature; it breeds all the year round, but in the cold weather is longer in going through its

mutations and does not thrive well. This might be obviated by keeping the room warm, but we should be thrown out by the want of leaves, the mulberry putting on its wintry garb of bare branches."

This information was kindly furnished from the Radnagore district, but it is equally applicable to all others in India, the time occupied from egg to cocoon varying always with the temperature in which the worm is reared, being, as with the other species, more rapid in a high than in a cold temperature, as witness Dr. Bonavia's experiments in Oudh, seventeen days in June and fifty-one in November.

Mr. Blechynden's remarks as to the worms thriving better in summer than in winter tend to support my opinion that the monthly worms belong naturally to the more genial temperature of the south, while the annuals only belong to the colder mountainous regions of the north. It is also said of this worm that "yellow cocoons will produce insects that give white silk, but that insects from white cocoons never produce yellow." Here then is a corroboration of my previous argument that white is a sign of degeneracy and weakened constitution.

From what has already been said, then, I think ample proof has been furnished of the existence of at least six species of domescated *Bombyces*, instead of one as heretofore supposed.

Before passing on to a consideration of the wild species I would say a word respecting the hatching of the eggs of *B. Mori* for a second crop: at Mussooree, where this was first observed, we have in effect what may be termed a double season, or two springs, so that when after the rainy season the temperature falls back to from 68° to 62°, the eggs will again begin to hatch. I have observed this both in *B. Mori* and *B. textor*, but I am inclined to think that it will only occur with worms in a transitional state, that is to say, before they have become acclimatised; and that as soon as this has been effected the irregular hatching may be expected to cease. For three years my worms of selected *B. Mori*, or the dark kind, have given a second crop; but the very attempt to cause them to revert may have had some effect in unsettling them, for the white variety I have never found to yield a second brood. With *B. textor* the same thing occurred, and for three or four years they continued to give an autumnal crop; this year, however (although *B. Mori* is now in September hatching in a temperature of 68°), the *Boro-pooloo* remains unhatched, although in previous years the hatching commenced about the 22nd of August, a full month earlier. I expect, therefore, that *B. Mori* will eventually likewise settle down again into an annual. That the hatching is in some

measure to be attributed to the alteration of climate seems proved by the fact that the *Boro-pooloo* removed from Bengal into Oudh began to hatch for a second crop in the month of April, but was checked by being placed in a colder temperature. (Dr. Bonavia's Report, 1864, p. 8.)

Of the moths of the different species I have said nothing because I do not consider any one of them to be in a natural state; at present, with the exception of size, the same description would apply nearly equally well to all of them; and it is to be observed, moreover, that, even taking each species separately, there will be found a very great variety among the moths, so that it would be next to impossible to decide as to which was to be regarded as a typical specimen. Pale ashy-white, with a brownish band running parallel with the exterior margin of the upper wings, is the usual appearance, although the band is often either partially or altogether absent. This uncertainty must be attributed to the unsettled condition of the insects, and will never cease until each is restored to something like its original vigour of constitution.

Wild indigenous Species of India.

Turning now to the wild species of Continental India, we are at once struck by the fact that, instead of being exclusively restricted in their diet to the mulberry leaf, as are the domesticated worms from China, one only of the four known species is found upon that tree, while two of the others are respectively restricted, it would appear, to the *Ficus religiosa* and *Artocarpus lacoocha*, the food of the fourth species being unrecorded.

Besides this peculiarity, the wild species are remarkable for the variety and beauty of the colours with which the worms are ornamented, as well as by the presence of several longitudinally-disposed rows of semi-horny spines in addition to the dorsal spine on the penultimate segment, as possessed by all the Chinese species.

These natural differences in the two sections of this group are not, however, in my opinion, sufficient to warrant the inference that the wild and the domesticated species belong to different genera, any more than the presence or absence of tails, in the species of the genus *Papilio*, could do so; for we see that in respect to colour, the Chinese worms, when restored to some degree of health, exhibit a very different appearance from that of the worm in its usual sickly state, and that they actually make a near approach to the uncultivated species. Besides which, there are so many traits in the habits, manners, structure and

produce of the two sections that are common to both, that the differences observable can be regarded only as specific and not generic; and although the food of the wild species differs in some instances from that of the domesticated races, yet in every case the trees are found to belong to the same family, and to be closely allied to the mulberry.

I consequently feel inclined to reject the Genus *Theophila*, which Mr. F. Moore (see Trans. Ent. Soc., 3rd Series, i. 315) proposes to establish for the reception of the wild species; more especially since it is very doubtful whether one at least of these could stand under either *Bombyx* or *Theophila*, while as regards *B. subnotata* of Singapore, we know nothing of the larva, and therefore cannot say whether or not it exhibits the spines and other characteristics of the known wild larvæ; and the same may be said of *B. religiosæ*.

It is this eagerness on the part of European systematists to give names to the species contained in the Noah's arks over which they preside, that leads to so much positive confusion as to what is, and what is not, a species,—a remark well illustrated by the late creation of an *Antheræa* under the specific name of *Mezankooria* (see Trans. Ent. Soc., 3rd Series, i. 318), which name is applied in Assam, by the native sericulturists, to distinguish the silk of the Mooga (*Antheræa Assama*), when fed upon the tree called *Addakoory*, from that produced by it when fed upon other trees. A very similar mistake, at which the working naturalist may, without offence, be permitted to smile, was recently made by a French *savant* of some repute, who applied to me for information regarding certain alleged species of Tussur moths, known in India as *Antheræa Teriah*, *Anth. Dabrah*, *Anth. Mooga*, and several more, these being, not the names of insects, but technical terms applied by the native cultivators of Beerbhoom to particular qualities of cocoons of *Antheræa Paphia*, which are assorted according to size, colour, &c., under these various titles.

It would appear that while one school is labouring hard to prove that all organized beings are the descendants of "one primordial type," others are equally bent on proving that each species is *sui generis*, and entitled to stand alone.

7. Bombyx Huttoni, Westw. (Pl. XIX. fig. 4.)

Syn. *Bombyx Huttoni*, Westwood, Cab. Or. Ent. pl. 12, f. 4.
Theophila Huttoni, Moore, Trans. Ent. Soc. Lond., 3rd Series, i. 314, 315.

This species, which feeds on the wild indigenous mulberry tree of the North Western Himalaya, is apparently confined to the

mountains, from the neighbourhood of Dehra, at about 2,000 feet of elevation up to 7,000 and even 8,000 feet. It does not appear to occur in Nipal, but ranges westward from about Kemaon. This worm is double-brooded, and yields two crops of silk in the year; this is of the very best quality, but unfortunately the worm is so erratic and intractable, that hitherto all attempts to domesticate it have proved abortive; it will not remain in the feeding trays, like the Chinese worms, but wanders away until the brood is lost. The only method of rearing it is to leave it at full liberty on the trees, where it remains perfectly quiet and contented, but has so many enemies to contend with, in the shape of birds, flies, bugs and wasps, as to render a crop of silk very precarious and almost unattainable, without constant watching and expense, which renders the crop unprofitable.

As previously stated, I discovered this species at Simla in the autumn of 1837, on the wild forest mulberry, and again after the campaign in Afghanistan, at Mussooree in 1842, at which time I sent it to Mr. Westwood, in England.

The wild mulberry-tree of the North Western Himalaya usually comes into leaf about the first week in March, but of course this is in a great measure dependent upon the situation, elevation and temperature of the season.

The eggs of this silkworm are firmly attached to the bark of the tree, sometimes on the trunk, but more generally on the underside of the branches, where they remain spread out in clusters and exposed all the winter to the action of the frost, but where they are at the same time protected from the rain and snow, so as to run no risk of being washed off by the dissolving of their agglutinating gum.

The colour of the egg is a pale straw-yellow, which, unlike the eggs of the Chinese races, is retained to the last. The egg is considerably larger than those of *B. Mori*. The young worm is disclosed from the egg a few days after the opening of the leaf-buds; the hatching is, however, very irregular and continues sometimes even up to the end of April, although this is generally dependent upon the situation of the tree.

In some seasons these worms are so numerous that the trees are completely denuded of every leaf by the middle of May, and in such cases the worms, after gnawing off all the leaves which envelope the cocoons already formed, are compelled to descend from the tree and spin among the leaves of the neighbouring shrubs and bushes, while many that are still immature necessarily die of hunger, or fall a prey to birds. The trees that have been thus denuded speedily put forth fresh leaves, to be in due time consumed

by the autumnal brood. Trees thus stripped in the middle of May will be again in full foliage by the end of the first week in June.

It is curious to observe the instinctive knowledge which these worms appear to possess of the approach of a hail-storm; no sooner are the peals of thunder heard, than the whole brood seems to regard them as a warning trumpet-call, and all are instantly in motion seeking shelter beneath the thicker branches, and even descending the trunk of the tree to some little distance, but never proceeding so low down as to lose the protecting shelter of the boughs. For rain they care nothing, but appear to be able to distinguish between the coming of a heavy shower, and the more pitiless pelting of the hail.

When the caterpillar is newly hatched its appearance, as seen under a good lens, is as follows:—Head and pro-legs shining jet black; body dark brown, approaching to black; the first segment whitish-ash, the fourth pale rufous, as are the anal feet; tubercles disposed in longitudinal rows, giving forth short tufts of hair; a small anal tubercle on the penultimate segment: thus far there is scarcely a difference between it and the young Chinese worm. Length fully $\frac{1}{8}$ of an inch: strong and robust, as compared with the best domestic stock. In the course of a day or two, the four anterior segments become greatly swollen and of a faint livid cream-colour, the dorsal portion being mottled or dotted with deep brown; the orange or rufous colour of the fourth segment somewhat deeper.

About the fourth day the four anterior segments become swollen up very remarkably into a globular form, the dark spots being apparently beneath the skin; the rest of the body dark brown, with here and there a tinge of dull yellowish. On the fifth day they prepared to moult. After the first moult, the second and third segments form a globular ball, apparently out of all proportion to the rest of the body; the general ground colour becomes creamy-white, with the fourth segment yellow, the second and third being dotted above with dull leaden-grey; the remainder closely marbled over, or variegated without any definite arrangement, with black, grey, orange, ash and yellow blending like tortoise-shell; the fleshy tubercles or spines short, conical and brown; skin smooth.

In the subsequent stages the general appearance remains the same, except that the spines are long and taper to a point, being fleshy at the base, but becoming somewhat horny towards the summits; all bend backwards in a curve except the central one on the penultimate segment, which lies down horizontally and points forward.

When mature the ground colour becomes yellowish-white beautifully and closely marbled over with orange, dark ash-grey, leaden blue and brown; the second and third segments swollen into a large globose mass; the anterior segment creamy-yellow, which colour extends backwards on each side in a broad band through the sixth segment. This resembles the ashy band apparent in the worm of *B. Mori*, after reversion to its natural dark hue. There are two dorsal rows of long, black, slender and sharp-pointed spines commencing with the fifth segment, their base being orange-brown, and the four anterior segments being without them, as in *Attacus Atlas;* on the anal shield are four somewhat conical orange-brown rudimentary tubercles, and rows of small ones along the sides; the dorsal portion of the four anterior segments clouded or blotched with dull leaden-grey markings, apparently showing from beneath the skin; on the third segment are two brown spots or ocelli, marked within with several minute irregular dots of bluish-white; on the front of the second segment are two similar round spots, having a narrow edge and central dot of bluish-white; there are likewise several black spots both before and behind these ocelli; on the fifth segment are two irregular-shaped jet-black spots dotted with bluish-white, and from the centre of these springs the first pair of dorsal spines, which are altogether black: head mottled brown and grey.

It is, however, almost impossible accurately and minutely to describe the distribution and blending of the various colours with which the insect is ornamented.

The cocoon is spun within the leaf from the beginning of May to the end of that month, according to the time of hatching, but I have sometimes taken cocoons as early as the 15th of April and again in September.

The figure of the moth, as represented on pl. 12 of Westwood's Cabinet of Oriental Entomology, is, in several respects, very faulty, owing to the specimen sent to him having been injured during its long journey.

Expanse of wing in the male $1\frac{3}{4}$ inch; of females in general $2\frac{3}{10}$ inches. A black transverse band crosses the upper part of the abdomen at the waist, the posterior edge of which is bordered by a narrow line of ash; on the reflected abdominal margin of the hinder wings are two white spots; all the markings on the wings are of the same character as those upon the wings of *B. Mori*, but are far better defined and more intense than those in Westwood's figure. On the hinder wings the sub-marginal line is ash-coloured, as is also that on the upper wing. The plumes of

the antennæ are likewise much longer than in the figure, which, taking it all in all, is very inaccurate.

In order if possible to reclaim this species and reduce it to a state of domestication, I succeeded in 1859 in obtaining a reciprocal cross between it and the Cashmere worm. In this experiment the female wild moth was coupled with the male *B. Mori*, and the female *B. Mori* with the male *B. Huttoni;* the coupling of the latter was effected with the greatest difficulty, and the few eggs obtained were all unprolific; this always proved to be the case in repeated trials. With regard to the other attempt, the difficulty was not so great, the domestic males eagerly sought the wild females; the latter, however, exhibited an unmistakable dislike of such pigmy sweethearts, though a few coupled and deposited eggs. Still very few of these were prolific, and the caterpillars produced from them retained all the intractable habits of the wild stock, and were accordingly placed upon the trees, where in due time they spun their cocoons. But neither in the caterpillar nor in the cocoon was there any perceptible difference from the wild race, and although some of these females were again crossed by hybrid males, the progeny was still to all intents and purposes as decidedly *B. Huttoni* as at first.

From the refusal of the wild males to couple, and from the great difficulty experienced in inducing the females to allow the domestic males to approach, it may be said that a generic division would be justifiable; yet a certain coupling did take place and the progeny was fertile, although the strength and health of the wild race completely outweighed the influence of the degenerated domestic stock.

It was with a view to the eventual cultivation of the silk of this species that, after a lengthened correspondence, the Government of India in 1858 consented to the formation of a mulberry plantation at Mussooree under my superintendence, but having fully satisfied myself in the course of the second year, that from the intractable nature of the worm it would be impossible to domesticate it, the Government was only too glad to foreclose the experiment, while I having purchased the only tract of land suitable and available for the experiment, was left to "pay the piper" on the plea that the purchase had never been ordered!

8. Bombyx Bengalensis, Hutton.

The Wild Bengal Silkworm. (Pl. XIX. fig. 5.)

This species has apparently become exceedingly rare, if not extinct, in the neighbourhood of Calcutta, where it feeds on the

Artocarpus lacoocha, and was discovered some years ago by the late W. Frith, Esq., of Calcutta, who showed me specimens of the moth in 1849, but stated that the worm fed on the mulberry tree and was not uncommon about Moorshedabad. The moth, however, which he then showed me was totally unlike one presented by Mr. A. Grote, being larger and of a brown colour. Can there be an undescribed species at Moorshedabad?

Of *B. Bengalensis* I have never been able to procure the eggs, although Mr. Grote has interested himself in the matter; he now reports that for the last year or two the species has disappeared. It is probable, however, that it might still be procurable in other parts of Bengal where the bread-fruit tree flourishes. From a well-executed coloured drawing of the larva, furnished through the kindness of this gentleman, I am enabled to record its appearance as follows:—Head brown; from the head to the middle of the sixth segment ashy white or cream colour; the second and third segments wrinkled and slightly intumescent, bearing a few small rufous spots; prolegs rufous brown, with blackish tips; from the middle of the sixth segment to the anal feet pale rufous-brown, each segment dotted with black; stigmata oval white rings, with a black centre; on the dorsal portion of the fifth segment are two slightly raised round black spots, from the centre of which radiate narrow white stripes, and from which rise the first or anterior pair of dorsal spines, which are wholly black; on the eighth segment are two similar spots of a rufous-red colour with white rays, and bearing two black spines; all the other segments bear black dorsal spines, with rufous bases; the spine on the centre of the penultimate segment very large and strong, thick at the base or lower half, and becoming suddenly attenuated and falcate, pointing backwards, the tip only black, the rest pale rufous; the dorsal spines are represented as standing erect. Legs rufous-brown, each bearing a pointed whitish stripe down its centre. The four anterior segments smooth and without spines. In point of size it appears to be far inferior to the larva of *B. Huttoni;* the four anterior segments make no approach to the globular mass which characterises that part in the Himalayan species, neither does it at all resemble it in the colouring.

The moth as furnished by Mr. Grote is of an ashy-white, and the cocoon that of a true *Bombyx*.

9. Bombyx subnotata, Walker.

Syn. *Bombyx subnotata*, Walker, Proc. Linn. Soc. Lond. iii. Zool. p. 188 (1859).

Of this species nothing more appears to be known than is contained in Mr. Walker's description of the moth (*ubi supra*), and that it was procured from Singapore by Mr. A. R. Wallace; neither the larva nor its food are mentioned.

In the absence of all information regarding the caterpillar, whether it is spined, like the two preceding, or smooth, as in the Chinese stock, it is impossible to decide upon the propriety of placing this species in the proposed new genus *Theophila*.

10. Bombyx Horsfieldi, Moore.

Syn. *Bombyx Horsfieldi*, Moore, Cat. Ind. Mus. ii. pl. xi. a, fig. 5.

This is not a Continental species and is merely inserted here to complete the series; the moth is described and figured in the Catalogue of the India Museum, but here again we know nothing of the larva, cocoon or food.

Its habitat is Java.

11. Bombyx Sherwilli, Moore, MS.

Syn. *Bombyx Sherwilli*, Moore, *in epistolâ*.

Of this again the larva is unknown, and indeed the habitat is doubtful too. According to Mr. F. Moore the specimen was obtained from a collection said to have been made in the S. E. Himalayas by the late Major J. L. Sherwill; but Entomologists who have long collected in that quarter assure me that they have never seen a specimen of *Bombyx* from thence. Nevertheless, this is but negative evidence; and if once a specimen has been obtained others may probably follow. According to Mr. Moore it is "allied to *B. Huttoni*, and differs from it in being somewhat larger, and of a greyer colour, the forewing having the apical patch fuliginous instead of black, and it has only a single transverse discal streak (instead of the two, as in *B. Huttoni*). A most prominent character is that the abdomen is tipt with black, as well as having the dark ashy waistband."

Large light-coloured specimens are sometimes seen of *B. Huttoni*, but I do not remember ever to have seen the abdomen tipt with black.

12. Bombyx religiosæ, Helfer.

Syn. *Bombyx religiosæ*, Helfer, J. A. S. Beng. vi. p. 41.
Bombyx Huttoni, apud Moore, Cat. Ind. Mus.
The Joree Silkworm Moth, Helfer.
The Deo-mooga Silkworm, Hugon, J. A. S. Beng. vi. pp. 32, 41.

Habitat Assam, Sylhet.

Of this species, notwithstanding the number of years that have elapsed since its discovery, and my repeated efforts to obtain it through the assistance of gentlemen resident in Assam, nothing more appears to be known than what Dr. Helfer recorded in 1837. It is said to be somewhat rare, but this I suspect is rather to be attributed to the want of research than to any actual scarcity, since the insect appears to have been in considerable abundance on the trees at the time when its discovery was made.

The larva of *B. religiosæ* is said to feed on the leaves of the Peepul tree or *Ficus religiosa*, and for want of more recent information I must content myself with the account furnished by Dr. Helfer (*ubi sup.*), calling attention to the fact of the worm bearing two names,—"*The Joree*" and "*The Deo-mooga*" silkworm, whence, together with one or two other circumstances to be pointed out, I am inclined to think there are two species united under this name, and that neither of them belongs to the genus *Bombyx*.

It is to be observed that the species was discovered in Cachar by Mr. Hugon in 1834, and he describes the worm as being active, *very slender in proportion to its length*, scarcely $2\frac{1}{2}$ inches long, of a reddish colour, and glazed, or shining. The moth, he says, is "very much like that of the mulberry; so is the cocoon also in appearance, colour and size."

Now in describing the worm there is not the least allusion to the slender semi-horny spines which are so remarkable both in *B. Huttoni* and *B. Bengalensis*, while the slender glazed form is again unlike those species, and seems to approach more closely to the genus *Ocinara*.

In regard to the cocoon, while Mr. Hugon declares it to be very like that of the mulberry worm, "in appearance, colour and size," Dr. Helfer, on the other hand, declares it to be "very different from the cocoon of the mulberry moth."

It is to be remembered, however, that Mr. Hugon spoke of an insect which he discovered in Cachar, while Dr. Helfer describes one discovered by Major Jenkins in Assam, where "it yields a

silk, if not superior, yet certainly equal, to that of *B. Mori*, [? *B. textor*, or *B. Crœsi*, probably]. The cocoon shows the finest filament, and has very much silky lustre. It is exceedingly smooth to the touch, and very different from the cocoon of the mulberry moth. The worm lives on the Pipul tree (*Ficus religiosa*)."

It seems to have been entirely overlooked that Mr. Hugon in Cachar found his worms on "the Bur-tree (*Ficus Indica*)," and that "in appearance, colour and size," they were very like the mulberry worm; while Major Jenkins in Assam found his on an allied, but still a different tree, "the Pipul (*Ficus religiosa*)," and the cocoon was "very different from that of the mulberry moth." Is it not quite possible that there may be two distinct species, the Deo-mooga of Cachar, and the Joree of Assam?

What renders the uncertainty still greater is the fact that Mr. Hugon himself "was unable to determine whether the Joree and Deo-mooga were the same, and was inclined, from the colour of the cocoons and the slight observations he was able to make on the latter, to think them distinct." My own opinion, judging from what has been advanced, and from the fact that the cocoons are said to be less even than those of the *Dasee* (*B. fortunatus*), is, that neither the one nor the other belongs to *Bombyx*, but will be found to be species of the allied genus *Ocinara*, an opinion supported in some measure by the nature of the food, these insects feeding on two species of *Ficus*, just as our two mountain species at Mussooree are confined to the *Ficus venosa*.

Genus Ocinara, Walker.

The insects of this genus, although in some respects allied to *Bombyx*, show likewise in the larva state a strong approach to the *Geometræ*, being characterized by knotty and dry bud-like excrescences, which, with the rigid attitude assumed when at rest, give the insect the appearance of a withered twig or piece of dry stick. In those discovered at Mussooree the larvæ appear to be almost entirely night-feeders, seldom moving during the day from the position they have taken up, which is usually at the end of a thin twig, along which they lie stretched out immovable, and to which they are so much assimilated, both in colour and ruggedness of appearance, as easily to pass unnoticed.

1. Ocinara Moorei, Hutton.

The larva of this species feeds on the *Ficus venosa*, and is found at Mussooree at an elevation of about 5,400 feet; it spins a small

white silken cocoon on the inner surface of the leaf, or even, should it fall from the tree, under a tile or stone, or against a flower-pot. There are certainly two broods during the summer months, and I suspect as many as three or four.

The larva is of an earthy-brown colour, and covered with short hairs; it has a raised transverse ridge across the second segment, in front of which is a blackish patch; it has a very short truncated spine on the middle of the penultimate segment, which usually lies down pointing backwards, and even with the plane of the back; it is, however, capable of being raised into an erect position when the insect is disturbed. The general appearance is rough and bark-like, and the ventral line is thickly fringed, as are the feet also, with rather long hairs.

The moth, judging from the description given by Mr. Moore of his species *O. Lida*, appears closely allied to it, and were it not that he makes no mention of the three black spots on the abdominal margin of the lower wings, of a black dot on the disc beneath, and gives palpi ferruginous instead of dusky black, I should have been strongly tempted to consider them as identical.

The wings in both sexes are of a creamy white, partially suffused with a faint ferruginous tinge; an indistinct undulating submarginal line bearing a ferruginous mark on each nervure, the largest being on the costal margin; abdominal and outer edges of the wings well fringed with long cilia, forming a well-marked border; an indistinct sub-basal wavy line with one or two indistinct ferruginous dots on the nervures; on the hinder wing is a wavy, very indistinct pale-brown band at about one-third from the margin; the fringe of the lower wings terminates in a projecting square patch, caused by the turning down or folding of the remaining portion of the abdominal margin, on which are three ferruginous dots. Body tricarinated, or having a dorsal and a lateral line on each side composed of tufts of long scales of a triangular form, and appearing like a projecting serrated line; colour very faint ferruginous, or sandy brown, very little darker than the wings. Antennæ bipectinated and faintly tinged with ferruginous; thorax, and forehead between the eyes, white; eyes, palpi, and inner side of forelegs, dusky black; under side ashy white, the wavy brown bands and spots well defined, and there is a black dot on the disc of the lower wings; body beneath whitish. Expanse of wing in the male $1\frac{1}{2}$ inch, in the female 2 inches.

The silk of this species is fine and elastic; the cocoon oval, flattened beneath where in contact with the leaf, convex above; it is enveloped in a light screen of floss silk, spread over it in

curls, and not web-like as in *Bombyx*. The cocoon is too small to become valuable. I have taken cocoons both in May and in August. The larva is usually found stretched along a thin branch, to which it clings very closely, and is scarcely distinguishable from the wood.

2. Ocinara lactea, Hutton. (Pl. XIX. fig. 6.)

The larva of this species feeds likewise upon the *Ficus venosa*, at the same place and elevation as the last, and is often found with it on the same tree. It appears to be a far more abundant species than the former, and is usually found stretched along the extreme end of a twig, and so close that it appears to be part and parcel of the branch; at other times it will be found obliquely erect and stiff so as to resemble a dry stick. When very young it resorts also to the edges and back of the leaf. It is without hairs, and quite naked. The young worm is of a pale-yellowish green, resembling the leaf-stalk upon which it rests; on the back of the second segment is a slightly raised transverse ridge tinged with brown, and on the fifth and ninth segments are two slightly-raised round tubercles of the same colour; an anal horn, on the penultimate segment, which is also light brown. When adult, the colour changes to a russet brown like the bark of the tree, and the transverse ridge and tubercles become well developed and somewhat darker than the rest of the body; the anal horn or spine generally appears as if truncated by the loss of the summit, —yet such is not the case, as the extremity is retractile, and is generally withdrawn into the lower part as a sheath; when the animal is about to moult, or is disturbed and irritated, the summit of this spine is exserted, and instead of being brown, like the base, is whitish; when exserted the whole stands erect, slightly inclining backwards. It would be a difficult task to explain the use of this curious contrivance, and I have been hitherto unable to detect anything that could lead me even to conjecture what purpose it can possibly serve.

The shape of the larva is similar to that of *O. dilectula*, as figured in the second volume of the Lepidopterous Insects in the India Museum, except that in the figure of the latter there are no raised tubercles.

From the larva of the preceding species it differs both in shape and habits. In *O. lactea* the entire form and appearance are those of a *Geometra*, but it nevertheless progresses in the usual way like the larva of *Bombyx*. In its manner of stretching from the twig to an adjacent leaf while feeding, and in its habit, when at rest,

of folding the prolegs together and obliquely raising all the anterior segments of the body, as far back as the sixth, off the surface of the twig or leaf, and at an acute angle with the plane upon which it stands, it very strongly resembles a *Geometra*, and gives one the idea of its forming a connecting link between that curious genus and the *Bombyces*. It feeds principally at night like the last, and in its younger stages is usually found at the extreme end of a young leafy twig, the terminal bud of which it strongly resembles. It spins a small compact cocoon, shaped like that of the last, but of a sulphur-yellow colour instead of white, and the flossy web which covers it is more closely woven into a kind of network, with regular open circular meshes. The eggs are at first of a very pale straw yellow, and are deposited in short lines of three to eight in each; after a time a red dot appears in the centre of the egg, and then, in a day or two more, the entire egg changes to a dark stone-grey, and the young worm speedily emerges.

The moth is small and white, often with the wings partially hyaline and iridescent, though this, I am inclined to think, arises from the abrasion of the scales, which are very loose and easily rubbed off. The upper wing has an indistinct and nearly obsolete submarginal and slightly undulating double line, with a minute black dot on each nervure, and a larger one on the costal margin flanked on each side by a smaller one. About the middle of the costal margin, at a little distance within the wing, is a black spot formed by two short parallel lines close together, and an almost obsolete double-curved line near the basal angle, running from the anterior to the posterior margin; both the wings are rounded externally. The lower wing has also an obscure brownish submarginal line without dots; a small black dot on the disc, which however is not always present, and three well-defined black spots on the fringe of the abdominal margin, which, as in the foregoing species, is folded down. The under-side is dull white, with the discal spots and submarginal lines more clearly developed than above. Eyes and palpi black; antennæ with white shafts and ferruginous plumes: body densely clothed with long hair-like scales; upper surface of body smoky ash-grey; thorax and forehead between the eyes white.

Throughout July and August the larvæ of this species are abundant at an elevation of 5,400 feet on the *Ficus venosa*, which the natives term "*Doodli*," from the milky nature of its juices which exude freely when a leaf is plucked. In the female of this moth

there is a dorsal keel, serrated, and composed of long scales. Expanse of female $1\frac{6}{10}$ inch, of male $1\frac{3}{10}$ inch.

3. Ocinara Comma, Hutton.

This occurs in the Dehra Doon at the foot of the mountains, where the moth is said to be usually found on the Mango tree, but it has not yet been ascertained whether the larva feeds upon its leaves or not.

The moth is white, both in wings and body, with a single comma-like black mark about the centre of the anterior margin of the upper wing and at a little distance from the margin; underside also white, with the comma mark a little less distinct, and on the centre of the hinder wing is a very faint indication of a black spot; antennæ bipectinate, the shaft white, with faint ferruginous plumes; the face and palpi dull yellowish; the two anterior pairs of legs each bearing two black spots on the outer edge; expanse of wing in a female $1\frac{9}{10}$ inch.

Appears in July and August.

Besides these, I am informed that other Continental species have been captured at Darjiling, but to these at present I have no access.

There are likewise two species from Java, noticed by Mr. Moore in the second volume of the Lepidoptera contained in the India Museum. These are—

4. Ocinara dilectula, Walker.

Syn. *Ocinara dilectula*, Walker, List Lep. Het. Brit. Mus. pt. vii. p. 1768 (1856); Moore, Catal. Lep. Ind. Mus. ii. p. 381.

Habitat Java, where procured by the late Dr. Horsfield. Like the species at Mussooree it is said to "feed upon a species of *Ficus*, bearing the native name of *Weringin*." This circumstance seems to point out the species of *Ficus* as the natural food of the genus, and makes me still more inclined to regard the *Bombyx religiosæ* as belonging in reality to *Ocinara*.

5. Ocinara Lida, Moore.

Syn. *Ocinara Lida*, Moore, Cat. Lep. Ind. Mus. ii. p. 381.

This is likewise a Javanese species discovered by Dr. Horsfield, but nothing is recorded of the larva or its food. The moth is described in the above-named publication, and appears to be closely allied to my *O. Moorei*.

Genus Trilocha, Moore.

1. Trilocha varians, Moore. (Pl. XIX. fig. 1 ♂, fig. 2 ♀.)

Syn. *Trilocha varians*, Moore, Cat. Lep. Ind. Mus. ii. p. 382.
Naprepa varians, Walker, List Lep. Het. Brit. Mus. pt. v. p. 1153 (1855).

This species, which is figured in vol. ii. of the Catalogue of Lepidoptera in the India Museum, is said to have been presented by J. N. Ward, Esq., from Canara, but nothing more is recorded; the figure given by Mr. Moore (*ubi sup.*) looks wonderfully like an *Ocinara*.

Note.—The larvæ here figured (Pl. XIX. figs. 1, 2), which I believe to be those of the male and female (the moths of both being also figured in the original drawings from which these are copied) were discovered in the neighbourhood of Calcutta, by Mr. A. Grote, by whom they were kindly forwarded to me. They were found in February and March, feeding on *Trophis aspera*, other larvæ being also taken on *Ficus indica* and *F. religiosa*. Spins a small yellowish-white cocoon, within the leaf or naked. Drawings of the same insect in all its stages were made by Mr. Walter Elliot during his residence in Madras, the larvæ there also being found on *Ficus religiosa*.—F. Moore, February, 1865.

DESCRIPTION OF PLATE XIX.

Fig. 1. Larva of *Trilocha varians*, ♂.
2. ,, ,, ,, ♀.
3. ,, *Bombyx fortunatus*.
4. ,, *Bombyx Huttoni*.
5. ,, *Bombyx Bengalensis*.
6. ,, *Ocinara lactea*.
7. ,, *Bombyx Mori*, reverted.
8. ,, ,, ,, as cultivated.

XV. *Descriptions of new Genera and Species of* Phytophaga. By J. S. Baly.

[Read 6th February, 1865.]

List of Species.

Pantocometes Downesii.
Glyptoscelis æneipennis.
,, *fascicularis.*
,, *albicans.*
Myochrous Sallei.
,, *explanatus.*
,, *armatus.*
Corysthea ferox.
Lamprosphærus (n. g.) *Hebe.*
,, 5-*pustulatus.*
,, *lateralis.*
,, *scintillaris.*
Chalcoplacis (n. g.) *sumptuosa.*
Chalcophyma (n. g.) *cretifera.*
,, *læta.*
,, *tarsalis.*
,, *tuberculosa.*
Endocephalus spilotus.
Colaspis elegantula.
Sophræna (n. g.) *ornata.*
Crepidodera elegantula.
,, *Brasiliensis.*
Aphthona mœrens.
Cœlomera ruficornis.
,, *læta.*
,, *bipustulata.*
Diabrotica coccinea.
,, *pulchra.*
,, *puncticollis.*
,, *sublimbata.*
,, *Deyrollei.*
,, *tenella.*
,, *suturalis.*
,, *Hebe.*
,, *discoidalis.*
,, 4-*vittata.*
,, *dimidiatipennis.*
,, *Saundersi.*
,, *subsulcata.*
,, *tetraspilota.*
Uroplata 12-*maculata.*
,, *Walkeri.*
,, *Stevensi.*
,, *Grayi.*
,, *terminalis.*
,, 16-*guttata.*

Fam. CLYTHRIDÆ.

Genus Clythra, Fabr.

1. *Clythra* (*Pantocometes*) *Downesii.*

Elongata, subcylindrica, cæruleo-viridis, nitida, subtus dense, supra sparse pube grisea vestita; thorace transverso, angulis posticis late rotundatis, lateribus anguste flavo-marginatis; elytris distincte subremote punctatis, pube suberecta sparse vestitis, fulvis, fascia transversa pone medium cærulea.

Mas.—Capite exserto, infra oculos prolongato, mandibulis productis, acutis, intus fortiter lobatis, facie rugosa; thorace lateribus rotundatis, antice convergentibus, disco sat profunde transversim excavato, subremote punctato; pedibus anticis longissimis.

Fœm.—Capite brevi, infra oculos non prolongato, mandibulis brevibus; facie lævi; thorace lateribus basi rotundatis, hinc ad apicem convergentibus, disco minus distincte transversim excavato, pedibus anticis non elongatis.

Long. ♂ 4, ♀ 3½ lin.

Hab. Bombay. Collected by E. Downes, Esq.

Fam. EUMOLPIDÆ.

Genus Glyptoscelis, Leconte.

1. *Glyptoscelis æneipennis.*

Elongatus, parallelus, subcylindricus, obscure rufus, nitidus, pilis albidis adpressis dense vestitus; antennis pedibusque pallidioribus, thorace transverso, sat crebre punctato, lateribus rotundato-angustatis; elytris viridi-æneis, inordinatim punctatis, transversim rugulosis, singulis apice productis, acuminatis, pilis fulvis et albis intermixtis vestitis, his hic illic in fasciculis parvis congregatis.

Long. 3 lin.

Hab. Venezuela, Trinidad.

2. *Glyptoscelis fascicularis.*

Elongatus, parallelus, subcylindricus, obscure piceus, supra pilis fuscis, subtus pilis albidis adpressis dense vestitus; pedibus obscure rufis, antennis rufo-fulvis, ad apicem infuscatis; thorace vix transverso, lateribus fere rectis a basi ad apicem convergentibus, minus crebre punctato, disco vittis quatuor pilorum pallidorum, duabus internis antice abbreviatis, ornato; elytris parallelis, apicem versus vix angustatis, singulis apice paullo productis, acuminatis, inordinatim punctatis, transversim rugulosis, obscure viridi-æneis, pilis fuscis et albis intermixtis vestitis, his hic illic fasciculatis.

Long. 4 lin.

Hab. Columbia.

This insect is easily separated from the foregoing by its somewhat larger size, different coloration, and by the fuscous pubescence of the upper surface of the body; the pale vittæ on the thorax are only visible in fresh specimens.

3. *Glyptoscelis albicans.*

Elongatus, subparallelus, subcylindricus, piceus, non metallicus, pilis adpressis obscure albidis dense vestitus, elytrorum pilis squamiformibus; antennis pallide fulvis, pedibus

rufo-testaceis; thorace subcylindrico, latitudine vix longiori, lateribus fere rectis, a basi ad apicem angustatis; elytris crebre punctatis, singulis apice vix productis, acutis.

Long. 4 lin.

Hab. ——?.

Genus Myochrous, Erichs.

1. *Myochrous Sallei.*

Elongatus, angustatus, parallelus, subcylindricus, dorso deplanatus, rufo-piceus aut piceus, squamulis adpressis albo-fuscis dense vestitus; antennis pedibusque pallide rufo-testaceis, genubus tarsisque obscurioribus; thorace elongatulo, lateribus obsolete tridentatis, cylindrico, basi subdeplanata, apice antrorsum valde porrecto; elytris fortiter punctato-striatis; tibiis anticis intus ante apicem spinâ brevi armatis.

Long. 3 lin.

Hab. Mexico.

Thorax more than a third longer than broad, sides not dilated, armed with three very minute teeth; anterior margin strongly produced, entirely concealing the head from above.

This pretty species may be distinguished from *M. explanatus* by the narrower body, and entirely different form of thorax.

2. *Myochrous explanatus.*

Elongatus, minus parallelus, convexus, dorso deplanatus, piceo-æneus, squamulis fuscis dense vestitus; antennis, labro, pedibusque (genubus tarsisque exceptis) obscure rufo-testaceis; thorace longitudine paullo latiori, margine antico sat valde porrecto, lateribus obsolete denticulatis, a basi ultra medium sat explanatis, ante apicem abrupte desinentibus; dorso antice convexo, postice deplanato; elytris minus parellelis, fortiter punctato-striatis; tibiis anticis intus ante apicem spinâ brevissimâ armatis.

Long. $3\frac{1}{2}$ lin.

Hab. Caracas.

Thorax rather broader than long, sides distinctly dilated, gradually diverging from the base to beyond the middle, where they abruptly terminate, their outer border furnished with three or four indistinct teeth; sides of elytra slightly oval.

3. *Myochrous armatus.*

Subelongatus, convexus, dorso modice deplanatus, obscure piceo-æneus, squamulis adpressis fusco-fulvis dense vestitus;

antennis obscure rufo-fulvis, æneo-maculatis; thorace latitudine vix longiori, lateribus distincte tridentatis, margine apicali antrorsum modice producto; elytris fortiter et rude punctato-striatis; tibiis anticis intus ante apicem spinâ validâ armatis.

Long. 3 lin.

Hab. Brazil.

Thorax scarcely longer than broad, sides moderately dilated, abruptly terminating before the apex, armed with three distinct teeth, anterior margin moderately produced; upper surface transversely convex, slightly flattened at the base, closely and coarsely punctured. Elytra oblong-subovate, convex, scarcely flattened along the suture.

Genus Corycia, mihi (olim).

Since the publication of the above genus (Journ. Entom. ii. 221), I find that the word *Corycia* had been already used in Lepidoptera; I therefore propose to substitute *Corysthea* as the generic name.

Genus Corysthea.

1. *Corysthea ferox.*

Oblonga, convexa, obscure cuprea, nitida; antennis pallide fulvis, ad apicem infuscatis; thorace elytris latitudine fere æquali, subcrebre punctato; elytris punctato-striatis, singulatim infra basin transversim impressis; tibiis posticis spinâ validâ armatis (♂).

Long. 3 lin.

Hab. Cayenne.

Face coarsely punctured, forehead impressed with an oblong fovea, vertex smooth, nearly impunctate. Thorax about equal in width to the elytra, sides slightly rounded and subparallel behind their middle, obliquely converging in front; above convex, anterior angles strongly deflexed, surface distinctly and somewhat closely punctured. Elytra slightly attenuated towards their apex, the latter regularly rounded; above convex, slightly deflexed from before their middle to the apex; basilar space in each elytron bounded outwardly by a perpendicular, and below by a transverse depression, the latter, however, not reaching to the suture; surface finely but distinctly punctate-striate, the striæ becoming somewhat confused towards their apex. Body beneath smooth and shining, the middle portion of the metasternum entirely occupied by a large transverse concave depression; apical segment of abdomen transversely sulcate.

Genus Lamprosphærus, mihi (olim).

In a paper in the Annals and Magazine of Natural History (1859, p. 124), I described some species of *Eumolpidæ* as belonging to the genus *Lamprosphærus*, the characters of which, as then understood by me, I at the same time laid down; subsequent study however of the group has shown me that the insects then described belong to no less than three very natural genera, confounded by me under one common head. I propose in the present place to give briefly the diagnostic characters of these three genera, retaining for one of them my old name—*Lamprosphærus*.

Genus Lamprosphærus.

Corpus breviter ovato-rotundatum aut rotundatum, valde convexum. *Caput* in thoracem insertum, perpendiculare; *antennis* gracilibus, filiformibus, longitudine corporis breviori-bus. *Thorax* basi elytrorum latitudini fere æqualis, margine laterali inferiori non incrassato; supra convexus, nunquam gibbosus, lateribus muticis, basi aut rotundato-angustatis aut rotundatis, hinc ad apicem angustatis. *Elytra* lævia aut confuse aut subseriatim punctata, *limbo* inflexo obliquo. *Pedes* mediocres; *femoribus* posticis muticis; *unguiculis* appendiculatis. *Prosternum* latitudine paullo longius, rarius transversum, sulcis suturalibus inter prosternum et episterna antica obsoletis; *episterni* antici angulo externo antico ad thoracis angulum non producto.

Type *Lamprosphærus collaris*, mihi, (Ann. and Mag. Nat. Hist. 1859, p. 124).

1. *Lamprosphærus Hebe.*

Ovato-rotundatus, valde convexus, fulvo-rufus, nitidus; vertice, thorace, elytrorumque tertio postico viridi-æneis; antennis pedibusque pallide fulvis, tibiis posticis intus curvatis, apice acuminatis; elytris seriatim punctatis; abdomine medio piceo.

Long 1½ lin.

Hab. Amazons.

2. *Lamprosphærus 5-pustulatus.*

Ovato-rotundatus, valde convexus, niger, nitidus; antennis pedibusque fulvis; abdomine, elytrorumque singulorum apice et pustulis duabus magnis, unâ basali, alterâ pone medium positâ, rufo-testaceis.

Long. 1½ lin.

Hab. Amazons.

Antennæ slender, filiform; head and thorax distinctly but not closely punctured; elytra more coarsely and deeply punctured, the puncturing arranged in irregular rows; striæ near the lateral border sulcate, their interspaces subcostate. Hinder pair of tibiæ inwardly curved, their apex produced, acuminate.

3. *Lamprosphærus lateralis.*

Valde convexus, subrotundatus, postice paullo angustatus, niger, nitidus; thoracis lateribus late fulvis; pedibus nigro-piceis, femoribus tibiisque anticis obscure fulvis; elytris fortiter subseriatim punctatis, apice obsolete acuminatis.

Long. $1\frac{3}{4}$—2 lin.

Hab. Brazil.

4. *Lamprosphærus scintillaris.*

Rotundato-ovatus, valde convexus, viridi-æneus, nitidus, subtus obscurior; labro antennisque flavo-fulvis, his apice infuscatis; thorace remote punctato; elytris æneis, sat fortiter subseriatim punctatis.

Long. 2 lin.

Hab. Amazons.

Genus Chalcoplacis, Chev., M.SS.

Corpus rotundatum, semiglobosum. *Caput* in thoracem profunde insertum, breve, perpendiculare; *antennis* gracilibus, subfiliformibus, corporis dimidio paullo longioribus. *Thorax* transversus, latitudine elytrorum paullo angustior, margine inferiori laterali incrassato; supra convexus, nunquam gibbosus, lateribus integris, muticis. *Elytra* confuse subseriatim punctata, interstitiis lævibus; *limbo* inflexo horizontali, plerumque concavo. *Pedes* mediocres, modice robusti; *femoribus* posticis muticis; *tibiis* paullo compressis; *unguiculis* appendiculatis. *Prosternum* subquadratum, sulcis suturalibus inter prosternum et episterna antica obsoletis; *episterni* antici angulo externo antico ad thoracis angulum non producto.

Type *Chalcoplacis abdominalis*, mihi, (Ann. and Mag. Nat. Hist. 1859, p. 124).

1. *Chalcoplacis sumptuosa.*

Subrotundata, valde convexa, nigro-cærulea, pedibus fulvis, supra aurea; antennis nigris, basi fulvis; elytris distincte

punctatis, utrisque infra basin transversim excavatis, læte purpureis, limbo inflexo leviter concavo.

Long. 2 lin.

Hab. Amazons.

Epistome slightly depressed, subtrigonate, its surface granulose; face broad, its lower portion slightly concave; forehead impressed with a short, longitudinal groove; eyes black, their inner edge obsoletely notched; surface of head and thorax finely but subremotely punctured. Elytra rather more coarsely punctured than the preceding parts.

Genus Chalcophyma.

Corpus breviter ovato-rotundatum aut rotundatum, valde convexum. *Caput* in thoracem insertum, perpendiculare; *antennis* gracilibus, filiformibus, corporis longitudini æqualibus aut paullo brevioribus. *Thorax* transversus, elytrorum latitudini æqualis aut ♂ etiam paullo latior, margine laterali inferiori incrassato; supra convexus, interdum gibbosus, lateribus rotundatis, plerumque dentatis aut emarginatis, rarius simplicibus. *Elytra* irregulariter aut subseriatim punctata, sæpe tuberculata vel costata, *limbo* inflexo obliquo aut subhorizontali, aut plerumque plano. *Pedes* subelongati, graciles; *femoribus* posticis subtus unidentatis, *unguiculis* appendiculatis. *Prosternum* subquadratum, sulcis suturalibus inter prosternum et episterna antica obsoletis; *episterni* antici angulo externo antico ad thoracis angulum non producto.

Type *Chalcophyma æruginosa*, mihi, (Ann. and Mag. Nat. Hist. 1859, p. 125).

1. *Chalcophyma cretifera.*

Breviter ovato-rotundata, valde convexa, cuprea, subnitida, subtus nigra; pedibus obscure rufo-fulvis; antennis pallide fulvis, extrorsum infuscatis; thorace rude rugoso, dorso bimamilloso, lateribus bidentatis; elytris rude punctatis, rugosis, cretis elevatis brevibus nonnullis longitudinaliter dispositis instructis.

Long. 2 lin.

Hab. Amazons.

Head coarsely punctured, face impressed with a longitudinal groove, the surface on either side obliquely strigose; antennæ equal in length to the body, very slender, filiform. Thorax very coarsely rugose-punctate, sides armed about their middle with

two short but stout teeth; middle of disc strongly raised, the gibbosity being separated, by a broad longitudinal sulcus, into two mamillose protuberances; the bases of each surrounded by a broad ill-defined circular groove. Elytra even more coarsely rugose than the thorax: on their surface are numerous short, strongly elevated ridges, which are arranged in three or four longitudinal rows. Four hinder thighs each armed beneath with a short tooth.

2. Chalcophyma læta.

Ovato-rotundata, valde convexa, nitida, subtus æneo-picea, supra metallico-viridis; antennis rufo-fuscis, his basi tarsisque fulvis; thorace lateribus rotundatis, ante medium angustatis, obsolete bidentatis, dorso convexo, ad latera crebrius, disco remote foveolato-punctato; elytris fortiter sed remote punctatis, punctis substriatim dispositis, interstitiis planis, impunctatis; femoribus quatuor posticis subtus obsolete unidentatis.

Long. $1\frac{2}{3}$ lin.

Hab. Amazons.

Antennæ slender, rather longer than the body; above bright metallic green, beneath æneo-piceous, with a faint violaceous tinge.

3. Chalcophyma tarsalis.

Ovato-rotundata, valde convexa, cuprea, subtus nigro-picea, nitida; pedibus purpureo-æneis; labro, tarsis, antennisque fulvis, his obscuris, articulis septimo apice penultimo ultimoque totis fuscis; thorace lateribus rotundatis, obsolete bidentatis, dorso profunde foveolato-punctato; elytris subremote fortiter punctatis, infra basin transversim depressis, modice elevato-costatis, costis antice interruptis; femoribus quatuor posticis subtus unispinosis.

Long. 2 lin.

Hab. Amazons.

Head punctured, face obliquely strigose on either side, impressed in the middle with a broad, longitudinal furrow. Thorax deeply impressed with numerous punctiform foveæ, which are rather less crowded in the middle of the disc; on the centre of the latter are also four or five slightly raised impunctate spaces. Elytra subacutely rounded at their apex, very convex, their hinder portion obliquely deflexed; surface subremotely punctate, the punctures arranged in irregular striæ; on each

elytron are about eight broad but moderately raised costæ, which, entire towards their apex, are more or less interrupted on the anterior portion of the elytron.

4. *Chalcophyma tuberculosa.*

Subrotundata, valde convexa, obscure ænea aut cuprea, subnitida, subtus piceo-ænea; pedibus pallide rufo-piceis; antennis fulvo-fuscis, basi fulvis; thorace lateribus medio angulatis et unidentatis, dorso rude rugoso, elevato-reticulato, disco obsoletius gibboso, medio longitudinaliter sulcato; elytris rugosis, tuberculis conicis numerosis hic illic (præsertim ad basin et ad apicem) coeuntibus et cretas longitudinales breves formantibus; femoribus quatuor posterioribus subtus unidentatis.

Long. $1\frac{3}{4}$—2 lin.

Hab. Amazons.

Head distinctly punctured, face obliquely strigose on either side, impressed in the middle with a broad longitudinal furrow; antennæ fusco-fulvous, the fifth, sixth and seventh joints being stained with fusco-æneous; two basal joints, together with the labrum and palpi, bright fulvous; jaws nigro-piceous, epistome piceo-æneous. Elytra closely covered with small strongly raised conical tubercles, which here and there coalesce and form short longitudinal ridges: of these latter four at the base of each elytron and two on the middle disc are more strongly raised than the rest.

Genus Endocephalus, Chevr., Dej. Cat.

1. *Endocephalus spilotus.*

Anguste-oblongus, subparallelus, fulvus, nitidus; oculis, mandibulis, capitis maculâ, thoracis maculis quatuor subquadratim dispositis, scutello elytrorumque maculis decem (his in seriebus transversis tribus, 2—4—4, primâ infra, secundâ vix ante tertiâque pone medium dispositis) nigris; elytris sat fortiter subcrebre punctatis.

Long. $3\frac{1}{2}$—$4\frac{1}{2}$ lin.

Hab. Amazons.

Genus Colaspis, Fabr.

1. *Colaspis elegantula.*

Oblongo-elongata, rufo-fulva, nitida; antennis (basi prætermissâ) oculisque nigris; thorace transverso, lateribus medio angulatis; elytris rugoso-, prope suturam substriatim-punctatis, infra

basin transversim depressis, læte metallico-viridibus, utrisque maculâ magnâ orbiculatâ basali, vittâque latâ vix ante medium fere ad apicem extensâ cupreis.

Long. $2\frac{1}{2}$ lin.

Hab. Amazons.

Fam. GALLERUCIDÆ.

Sub-fam. HALTICINÆ.

Genus Sophræna.

Corpus anguste ovale, convexum. *Caput* modice exsertum, perpendiculare; *antennis* brevibus, robustis, subincrassatis, articulo 1mo incrassato, 2do brevi, modice incrassato, 3tio paullo elongato, 4to brevi, obtrigono, 5to ad 10um singulis adhuc brevioribus, transversis, paullo ampliatis, leviter compressis, 11mo articulum basalem longitudine fere æquante, subovato; *facie* late carinata; *oculis* subrotundatis, prominulis. *Thorax* transversus, lateribus rotundatis, anguste marginatis. *Scutellum* trigonum. *Elytra* thorace paullo latiora, ovata, anguste marginata, *limbo* inflexo fere horizontali; supra confuse punctata. *Pedes* modice robusti; *coxis* anticis vix elevatis, transversis; *femoribus* posticis incrassatis, subtus canaliculatis; *tibiis* posticis dorso tricarinatis, apice spinâ brevi acutâ armatis; *tarsis* posticis tibiarum apicibus insertis.

Type *Sophræna ornata*.

1. *Sophræna ornata*.

Ovalis, modice convexa, flava, nitida; antennis extrorsum oculisque nigris; elytris postice rufo-fulvis; thoracis maculis arcuatis duabus disco transversim positis, elytrorum lineâ suturali antice, limbo laterali utrimque abbreviato, fasciâ sinuatâ prope medium positâ, maculisque nonnullis disci anterioris, nigro-piceis.

Long. 3 lin.

Hab. Amazons.

Genus Crepidodera, Foud., Allard.

1. *Crepidodera elegantula*.

Elongata, subparallela, cupreo-ænea, nitida; pedibus antennisque flavis, his extrorsum fuscis; capite lævi, vertice utrinque foveis rotundatis (circa 5) leviter impressis; thorace vix transverso, antice convexo, lævi, punctis minutis sparse im-

presso; elytris setulis suberectis sparse vestitis, fortiter punctato-striatis, interstitiis planis, ad latera convexiusculis.

Long. 1 lin.

Hab. Brazil.

Head triangular; lower portion of face clothed with long silky hairs, facial ridge narrow, *encarpæ* subtriangular, mouth obscure fulvous; antennæ rather longer than the head and thorax, stout, distinctly thickened towards their apex, five or six basal joints fulvous, the rest fuscous. Thorax rather broader than long, its anterior margin sparingly clothed with silky hairs; sides nearly straight and parallel, converging at their apex, broadly margined, the anterior angles slightly thickened, obtuse. Elytra much broader than the thorax, nearly four times its length, sides subparallel; interspaces between the striæ impressed with a row of distantly-placed minute punctures.

2. *Crepidodera Brasiliensis.*

Subelongata, ovata, fulva, nitida; antennis extrorsum oculisque nigris; capite thoraceque lævibus, impunctatis; elytris tenuissime sed regulariter punctato-striatis, striis ad latera obsolete sulcatis; tarsis infuscatis.

Long. $1\frac{3}{4}$ lin.

Hab. Brazil.

Very similar in form to *C. impressa:* the antennæ, their three basal joints excepted, black; elytra much more finely and regularly punctured, each stria being formed of a single row of regularly-placed punctures; sides of thorax rounded, converging at apex, anterior angles very slightly thickened.

Genus Aphthona, Foud., Allard.

1. *Aphthona mœrens.*

Breviter ovato-rotundata, convexa, nitida, supra nigra; antennis obscure fulvis, extrorsum infuscatis; subtus picea, pedibus fusco-fulvis; thorace tenuissime subcrebre punctato; elytris subremote tenuissime punctatis.

Long. $1\frac{1}{4}$ lin.

Hab. Brazil.

Sub-fam. GALLERUCINÆ.

Genus Cœlomera, Erichs.

1. *Cœlomera ruficornis.*

Subelongata, nigra, nitida; capite thoraceque coccineis; antennis scutelloque rufo-fulvis; elytris postice vix ampliatis, creberrime punctatis, opacis, nigro-sericeis.

Long. 4½ lin.

Hab. Brazil (Spirito Sancto).

Head sparingly clothed with long fulvous hairs, jaws black, labrum fulvous; front and vertex impressed with a longitudinal groove. Thorax transverse, sides obtusely angled about their middle, emarginate posteriorly; upper surface deeply transversely sulcate, smooth and shining, impunctate and glabrous on the disc, irregularly excavated, subrugose and sparingly pubescent on the lateral margin. Elytra oblong, scarcely dilated posteriorly. Under surface clothed with somewhat coarse adpressed pubescence. Abdomen punctured, apical segment emarginate, impressed before the apex with a distinct fovea.

2. Cœlomera læta.

Elongata, subparallela, rufo-testacea, nitida, fulvo-sericea; femorum apice, tibiis, tarsis, antennisque nigris; elytris nigro-cæruleis, subnitidis, crebre punctatis, minute granulosis.

Long. 5⅔ lin.

Hab. Rio Grande.

Front excavated, impressed together with the vertex with a longitudinal groove. Thorax transverse, sides rounded, narrowed behind the middle; upper surface broadly excavated transversely, remotely punctured, disc glabrous, sides sparingly pubescent. Elytra narrowly oblong, scarcely dilated posteriorly, moderately convex, slightly flattened along the suture, clothed at the base and sides with fulvo-sericeous hairs. Apical segment of abdomen emarginate.

I only know a single specimen of this species; it is probable that when in a fresh state the whole surface of the elytra is covered with sericeous pubescence.

3. Cœlomera bipustulata.

Subelongata, pallide fulva, nitida, pube concolori vestita, supra subopaca, fusco-sericea; vertice, thoracis disco, elytrisque viridi-nigris; antennis nigro-piceis, mandibulis nigris, tibiis apice tarsisque fuscis; thorace transverso, lateribus angulatis; elytris subparallelis, modice convexis, subfortiter crebre punctatis, singulatim limbo exteriori pustulâque magnâ disci medio positâ obscure fulvis.

Long. 4½ lin.

Hab. Ega, Upper Amazons.

Front and vertex impressed with a longitudinal groove. Thorax transverse, transversely concave, closely punctured; the dark patch on the disc is transversely-quadrate and covers nearly the whole of the surface.

Genus Diabrotica, Erichs.

1. *Diabrotica coccinea.*

Elongata, convexa, nitida, subtus flava; abdominis apice pleurisque nigris; tarsorum articulis duobus ultimis fuscis; supra læte coccinea; antennis flavis, harum articulis tribus ultimis, oculis labroque nigris, epistomate piceo; thorace subquadrato, lateribus subrectis, leviter sinuatis, apice convergentibus, dorso lævi, vix pone medium bi-foveolato; elytris subparallelis, postice vix ampliatis, singulatim apice sinuatis, angulo suturali acuto; dorso subcrebre tenuiter punctatis, profunde excavatis et sulcatis, basi et inter sulcos ventricosis.

Long. 5 lin.

Hab. New Granada.

Front impressed with a short longitudinal groove, which runs upwards and terminates on a level with the upper margin of the eyes in a deep fovea. Elytra impressed on the outer disc below the humeral callus with three or four large shallow foveæ; in addition on the inner disc are three broad transverse grooves; the first of these, semicircular, bounds the basilar space beneath; the second slightly curved, but the reverse way of the former, runs across the inner disc about its middle, and the third, oblique, is placed a short distance below the second; the basilar space on each elytron and the surfaces between the transverse sulci are slightly raised and thickened.

2. *Diabrotica pulchra.*

Elongata, subparallela, nigra, nitida; abdomine pedibusque flavo-fulvis, illo basi tarsisque sæpe infuscatis; tarsorum articulis duobus ultimis nigris; antennarum articulis basalibus tribus obscure fulvis, penultimis tribus albis; thorace transverso, disco transversim excavato, rugoso-punctato, fulvo, piceo-infuscato; elytris subelongatis, dorso subdeplanatis, rugosis, elevato-vittatis, viridi-æneis, limbo laterali, apice, fasciâque transversâ vix pone medium positâ, fulvis.

Mas.—Elytris apicem versus prope suturam cretâ brevi elevatâ instructis.

Long. 4—4½ lin.

Hab. New Granada (Magdalena River).

Head smooth, impunctate, forehead impressed with an oblong fovea. Thorax transverse, sides nearly straight, slightly sinuate behind their middle, obliquely deflexed, slightly diverging from behind forwards; disc depressed, broadly transversely excavated, rugose-punctate. Elytra subelongate, subparallel, slightly dilated from the base towards the apex, the latter rounded; surface rugose-punctate, disc of each elytron with five or six elevated vittæ, which commencing below the base are gradually lost towards the apex of the elytron, their surface equally rugose with the rest of the disc; the curved ridge in the ♂ smooth and nitidous, the fulvous colour of the apex extending upwards and covering its hinder two-thirds.

3. Diabrotica puncticollis.

Elongata, nitida, subtus nigra, supra nigro-ænea; pedibus pallide flavo-fulvis; tarsis antennisque pallide fuscis, his basi fulvis, articulo septimo abdomineque albis; thorace fortiter crebre punctato, dorso utrinque foveolato; elytris subelongatis, modice convexis, dorso subdeplanatis, crebre subrugoso-punctatis, elevato-vittatis, subopacis, margine laterali apice dilatato, fulvo.

Mas.—Elytris ante apicem prope suturam callo valido antice excavato armatis.

Long. 3 lin.

Hab. Columbia.

Lower portion of face coarsely punctured; front obliquely strigose on either side, impressed in the middle with a longitudinal groove. Thorax transverse, sides nearly straight, slightly diverging in front, sinuate behind their middle, all the angles prominent; disc closely and coarsely punctured, slightly flattened in the middle, impressed on either side with a deep fovea, the medial space between the two excavations being also depressed. Elytra subelongate, subparallel, slightly dilated towards the apex, moderately convex, flattened along the suture; each elytron with six or seven smooth elevated vittæ, the interspaces closely punctured, subrugose. The elytra in the ♂ are armed with a large smooth semi-lunate protuberance, placed transversely close to the suture, the concavity looking forwards.

4. Diabrotica sublimbata.

Elongata, viridi-fusca, nitida; abdominis segmentorum marginibus femoribusque pallidis; antennis nigris, articulis duobus ultimis (ultimi apice excepto) albis; thorace elytrisque prasinis, illo dorso bi-impresso, fusco-signato, his intra marginem unicostatis, crebre punctatis, suturâ lineâque submarginali nigro-fuscis.

Long. $2\frac{1}{2}$ lin.

Hab. Amazons.

Thorax subquadrate, sides nearly parallel, slightly sinuate, converging towards their apex; upper surface flattened, impressed in the middle with two large foveæ; three small patches placed in a triangle on the disc, together with a submarginal vitta on either side, fuscous. Elytra subelongate, slightly increasing in width from the base towards their apex, moderately convex, closely punctured; on each elytron, just within the lateral border, is a broad costa, which, commencing at the humeral callus, terminates a short distance below the middle of the elytron; surface immediately within the costa sulcate. Body beneath clothed with coarse adpressed griseous hairs.

5. Diabrotica Deyrollei.

Elongata, nigra, nitida; antennarum articulis duobus ultimis basi albis; epistomate, femoribus (his nigro-lineatis) thoraceque pallide flavis; hoc lævi, dorso obsolete bi-impresso, vittâ nigrâ tenuissimâ basi dilatatâ instructo; elytris oblongis, subparallelis, modice convexis, subopacis, minute granulosis, sat fortiter subcrebre punctatis, obscure viridi-æneis, utrisque fasciâ latâ prope medium, utrinque abbreviatâ, antice et postice emarginatâ, maculisque rotundatis duabus, altera infra basin alteraque subapicali, flavo-albis.

Long. 4 lin.

Hab. New Granada (Magdalena River).

Front triangularly impressed above the eyes. Thorax transverse, sides nearly straight and parallel, converging at their apex, anterior angles produced into an obtuse tooth; disc smooth, faintly excavated on either side. Elytra narrowly oblong, subparallel, apex regularly rounded; surface finely granulose, somewhat coarsely punctured.

I have named this species after M. H. Deyrolle of Paris.

6. *Diabrotica tenella.*

Elongata, viridis, nitida; pectore, abdomine, pedibus antennisque flavis, his articulis quatuor ultimis nigro-fuscis; thorace subquadrato, lævi, dorso bifoveolato; elytris paullo ampliatis, apice subtruncatis, prope suturam leviter obsolete sinuatis, prasinis, subnitidis, crebre punctatis.

Long. $3\frac{1}{2}$ lin.

Hab. Mexico.

Front impressed with a large fovea; mouth fulvous. Thorax subquadrate, sides nearly straight and parallel, slightly converging at their apex, anterior angles tuberculate; disc moderately convex, flattened at the base, smooth, impunctate, impressed on either side behind the middle with a large fovea.

7. *Diabrotica suturalis.*

Elongata, nigra, nitida; antennis sordide albis, basi infuscatis; thorace transversim excavato, piceo, apice, superficiei inferioris lateribus, femoribusque pallide fulvis, his dorso versus apicem, tibiis tarsisque fuscis; elytris subelongatis, paullo ampliatis, modice convexis, dorso subdepressis, tenuiter subcrebre punctatis, sordide fulvis, vittâ latâ suturali a basi fere ad apicem extensâ, medio constrictâ, nigrâ.

Mas.—Elytris apicem versus prope suturam cretâ elevatâ brevi instructis.

Long. 4 lin.

Hab. Cayenne.

Front impressed with a longitudinal groove, which runs upwards to the vertex, its middle impressed with a distinct fovea. Thorax transverse, sides nearly straight and parallel, sinuate behind the middle, converging in front, obliquely deflexed; upper surface nitidous, remotely punctured, broadly excavated transversely, either side of the excavated portion being more deeply excavated than the centre, and forming two distinct foveæ on its surface.

8. *Diabrotica Hebe.*

Subelongata, nigra, nitida; vertice thoraceque trifoveolato rufo-piceis; femoribus antennisque flavis, harum articulis quinque basalibus dorso piceis, articulo ultimo apice nigro; elytris ampliatis, subventricosis, singulatim apice obsolete sinuatis, sat fortiter subcrebre punctatis, castaneis, margine

laterali, parte tertiâ posticâ fasciâque latâ vix ponc medium positâ, marginem non attingente, sordide flavis.

Long. 4 lin.

Hab. Columbia (Bogota).

Front impressed with a large deep fovea. Thorax transverse, sides nearly straight, slightly converging from base to apex, anterior angles thickened; disc subremotely punctured, impressed on either side with a deep oblique fovea, a third smaller and rotundate being placed in the centre of the base, just in front of the scutellum.

9. *Diabrotica discoidalis.*

Subelongata, pallide flava, nitida; capite, scutello, pectore, femorum lineâ dorsali, tibiis tarsisque nigris; antennarum articulis tribus ultimis (ultimi apice excepto) albis; thorace vix transverso, dorso lævi, non foveolato; elytris a basi apicem versus ampliatis, convexis, tenuiter punctatis, disco nigris, fasciâ latissimâ mediali, antice posticeque profunde sinuatâ, limbum non attingente, flavâ.

Long. 4⅔ lin.

Hab. Banks of Napo, Ecuador.

Front impressed with a deep fovea. Thorax scarcely broader than long, sides nearly straight, slightly converging from base to apex, more quickly narrowed at the apex itself, posterior angles produced into an obtuse tooth; disc smooth, remotely and obsoletely punctured; in the middle of the basal margin is an indistinct depression. Elytra finely punctured, subovate, somewhat enlarged posteriorly, lateral margin broadly dilated.

10. *Diabrotica 4-vittata.*

Elongata, subtus nigra; thorace, metasterno plagâ utrinque, abdominisque segmentorum marginibus sordide albis; supra sordide alba, ore, vertice, antennis totis, thoracis plagis duabus scutelloque nigris; thorace transverso, dorso lævi, bifoveolato; elytris sat ventricosis, fortiter crebre punctatis, subopacis, utrisque vittâ submarginali, alterâ intra suturam, maculâque subapicali nigris.

Long. 4½ lin.

Hab. Brazil.

Front impressed with a deep fovea. Thorax transverse, sides nearly straight, slightly diverging from base towards the apex, sinuate behind the middle; disc smooth, impunctate, deeply im-

pressed on either side, the space between the foveæ being also depressed; the two black patches, triangular in shape, are placed one on each of the foveæ, the surfaces of which they more than cover. Elytra moderately inflated, gradually increasing in width from their base towards the apex, the latter regularly rounded; the two longitudinal vittæ, which are moderately broad, commence at the base and terminate each a short distance from the sutural angle, the spot which ought to form their point of junction being occupied by a small square patch; in some individuals the submarginal vitta is continued onwards and is united with the patch itself.

11. *Diabrotica dimidiatipennis.*

Subelongata, nigra, subnitida; elytris a basi apicem versus ampliatis, dense punctatis; capite (ore, antennis oculisque prætermissis), thorace bifoveolato, elytrorumque dimidio antico flavo-fulvis.

Long. 4 lin.

Hab. Peru.

Front impressed with a longitudinal groove, which, dilated at its middle, extends upwards to the vertex; antennæ entirely black. Thorax transverse, disc smooth, impressed on either side, just behind the middle, with a large oblique fovea. Scutellum triangular. Elytra closely and somewhat coarsely punctured.

12. *Diabrotica Saundersi.*

Subelongata, nigra, subopaca; capite, thorace bifoveolato, elytrisque fulvis, subnitidis, his ampliatis, dimidio postico nigro, opaco, granuloso, impunctato; antennarum articulis dorso piceo-maculatis, tribus ultimis nigro-piceis.

Long. $4\frac{1}{3}$ lin.

Hab. Quito.

Front impressed with a deep groove, which terminates just above the upper margin of the eyes in a deep fovea; antennæ fulvous, their joints more or less stained above and at the apex with piceous, three terminal joints pitchy-black. Thorax broader than in *D. dimidiatipennis*, impressed on either side, just behind the middle, with a very oblique fovea. Elytra much broader than the thorax, gradually increasing in width from base towards the apex, very convex; fulvous portion of their surface, which extends from the base to immediately before their middle, subnitidous, less closely and deeply punctured than in *D. dimidiatipennis;* black portion very opaque, impunctate, minutely granulose.

13. *Diabrotica subsulcata.*

Subelongata, obscure viridi-nigra, nitida; abdomine, femoribus antennisque flavo-fulvis, his articulo ultimo fusco; tibiis tarsisque pallide flavo-viridibus; thorace subquadrato, dorso lævi, non foveolato, lateribus et infra læte viridi; elytris a basi apicem versus ampliatis, subcrebre punctatis, disco ante medium obsolete bisulcatis, margine laterali apiceque læte viridibus, margine apicali rufo-piceo.

Long. $3\frac{2}{3}$ lin.

Hab. New Granada (Magdalena River).

Thorax rather longer than broad, sides nearly straight and parallel, disc not impressed with the usual foveæ. Middle disc of each elytron with two ill-defined slightly-curved longitudinal grooves, which, commencing at the base, terminate below the middle of the elytron; interspace slightly thickened.

14. *Diabrotica tetraspilota.*

Subelongata, robusta, pallide rufo-fulva, nitida; genubus, tibiis, tarsis antennisque flavis, harum articulis quatuor ultimis elytrorumque maculis magnis quatuor nigris; unguibus piceis; thorace transverso, dorso lævi, non impresso; elytris subovatis, valde convexis, infra basin transversim sulcatis, subremote tenuiter punctatis.

Long. 5 lin.

Hab. Mexico.

Front impressed with a large fovea. Sides of thorax straight and parallel, converging at their apex; disc shining, impunctate. Elytra subovate, slightly dilated posteriorly, somewhat broadly margined: on the disc of each are placed two large black patches; one just below the base, subtrigonate, with all its angles rounded; the second immediately below the middle, subrotundate.

Fam. HISPIDÆ.

Genus Uroplata, Chevr. M.S.

1. *Uroplata 12-maculata.*

Subcuneiformis, subdepressa, fulva; antennis thoracisque lateribus nigris; elytris obscure metallico-purpureis, utrisque maculis sex fulvis.

Long. 3 lin.

Hab. Santarem. Collected by Mr. Bates.

Narrowly wedge-shaped, subdepressed, bright fulvous; antennæ

moderately robust, subfusiform, slightly compressed, two basal joints short, nearly equal; the first strongly, the second moderately dilated; third nearly equal in length to the two preceding; fourth, fifth, and sixth short, equal; seventh slightly longer; eighth and three terminal joints closely united, their articulations distinct. Head smooth, impunctate; eyes pitchy black. Thorax at the base more than half as broad again as long; sides rounded, narrowed and sinuate in front; above subcylindrical, transversely excavated near the base; middle of disc with a shallow longitudinal groove; surface coarsely punctured, the punctures crowded at the sides. Scutellum smooth, its apex obscure purple. Elytra broader than the thorax, slightly increasing in width towards the posterior angles, the latter produced into a flattened spine, its apex bidentate; sides narrowly margined, their outer border coarsely serrate, serrations more distant when approaching the posterior angles; apex obtusely rounded, its margin slightly dilated, serrate; above subdepressed, each elytron with four elevated costæ, the two outer ones less raised, the second from the outer margin being interrupted for nearly the whole of its length; suture also raised, interstices each with a double row of deep punctures; dark metallic purple, each elytron with six bright fulvous spots; one at the base, the second oblique placed on the inner disc before its middle; two others beyond the middle, placed obliquely, the outer one attached to the lateral margin; the fifth transverse, subapical, confluent at the suture with its fellow on the opposite elytron, and the sixth narrow and transverse, placed on the apical margin, also confluent at the suture. Beneath shining fulvous; anterior pair of thighs simple.

2. *Uroplata Walkeri.*

Elongata, postice vix ampliata, subdepressa, fulva; thoracis vittâ laterali maculisque indistinctis duabus elytrisque viridi-metallicis; his serratis, apice truncatis, angulo postico acuto, vix producto, utrisque tricostatis, maculis quinque fulvis instructis.

Long. $3\frac{1}{2}$ lin.

Hab. Brazil.

Head strongly produced between the eyes, vertex smooth, impressed in the middle with a deep fovea; antennæ longer than the head and thorax, robust, indistinctly thickened towards their apex; two basal joints equal, subovate, very slightly thickened; third equal in length to the two preceding; fourth about half the

length of the third; the fifth still shorter; sixth transverse, two-thirds the length of the fifth; seventh not quite equal in length to the fifth, and, together with the four terminal joints, indistinctly thickened and slightly compressed, the apical joint acute; sutural lines between these last four joints entirely obsolete. Thorax at the base rather more than one half as broad again as long, sides nearly straight behind, narrowed and slightly rounded in front; basal margin deeply sinuate on either side, its middle portion produced into a short broadly truncate lobe, the surface of which is oblique and deeply impressed with a transverse groove; above subcylindrical, somewhat flattened in the middle, hinder portion of disc transversely excavated; surface closely covered with large round deep punctures. Scutellum transverse, subpentagonal. Elytra broader than the thorax, subparallel in front, scarcely dilated towards the hinder angles; lateral border narrow, indistinctly toothed; produced at the hinder angle into a flattened nearly rectangular plate, the apex of which is armed with one or two strong teeth; interspaces between the costæ deeply gemellate-punctate; third interspace dilated for a short space, commencing just below its middle; the puncturing in that portion of the surface being less regularly placed; each elytron with five large fulvous patches placed as follows—one on the humeral margin; a second on the inner disc, just below the basilar space, common and forming with its fellow on the opposite elytron a large subcordate patch, from the upper and outer angle of which a narrow ramus passes upwards along the second costa to the base of the elytron, where it is dilated and forms a small spot; the third quadrate, placed on the outer disc, about its middle, attached to the lateral border, and extending across the elytron as far as the first costa; the fourth, commencing at a point parallel with the lower edge of the third, is placed on the inner disc, common like the second, and extends downwards nearly to the apex of the elytron, its hinder half being outwardly dilated, and forming a transverse subapical fascia, abbreviated on the outer disc by the extreme edge of its dilated portion; it is confluent with the fifth patch, which is placed on the outer margin halfway between the middle and apex.

3. *Uroplata Stevensi.*

Elongata, subcuneiformis, subdepressa, fulva; antennis nigris; thoracis lateribus vittâque elytrisque viridi-æneis; his quadricostatis, angulo postico in spinam compressam acutam lateraliter productis, apice obtuse truncatis, utrisque quad-

ricostatis, et maculis quinque fulvis instructis; corpore subtus obscure fulvo; pedibus flavis.

Long. 3 lin.

Hab. San Paulo, Upper Amazons.

Elongate, subcuneiform, subdepressed. Antennæ moderately robust, subfusiform; their basal joints nearly equal in length, the first two thickened, the third slender; fourth and fifth each rather shorter, equal; sixth about equal to the third, seventh distinctly elongate; eighth and three following closely united, their articulations obsolete. Head smooth, front indistinctly impressed between the eyes, vertex with a dark metallic green patch. Thorax nearly one third broader at the base than long; conic, sides slightly sinuate, the anterior angles produced into a small obtuse tooth; above convex, transversely excavated near the base, basal lobe transversely grooved; surface rugose-punctate; fulvous, a narrow line on the extreme lateral margin, together with a broad vitta down the middle, metallic green. Scutellum subquadrate, its apex rounded, surface smooth, impunctate. Elytra broader than the thorax, humeral angles rounded; sides nearly parallel, scarcely diverging posteriorly, narrowly margined, their outer edge serrate, posterior angles produced laterally into a large flattened acute spine; apex obtusely truncate, its outer edge toothed; above subconvex, flattened along the suture, shoulders slightly prominent; each elytron with four elevated costæ, the suture also costate, interspaces each with a double row of deep regular punctures, first interspace from the suture with a third row at its base; metallic green, each elytron with five bright fulvous patches; the first elongate, extending from the base to beyond the middle, its base and apex curving inwards; the second small, placed just below the scutellum, common, confluent at its outer edge with the first; the third narrow, on the outer border just above the posterior angle; the fourth subapical, common and forming a broad transverse patch; and the last narrow, placed on the apical border, rufous. Beneath obscure fulvous; legs yellow; thighs simple.

4. *Uroplata Grayi.*

Late oblonga, subcuneiformis, depressa, subtus nitida, rufo-picea; pleuris prothoraceque nigris; pedibus fulvis, tarsis infuscatis; supra subnitida; capite nigro, thorace scutelloque fulvis, illo vittulis quinque nigris; elytris apice obtusis, serratis, angulo postico laminâ compressâ trigonâ obtusâ, postice serratâ, dorso concavâ, lateraliter valde productâ, instructis; utrisque

quadricostatis, costis duabus exterioribus apice confluentibus, tertiâ medio fere interruptâ; obscure nigro-purpureis, maculis parvis numerosis disci, maculâque transversâ communi ante apicem, fulvis; femoribus anticis subtus spinâ brevi armatis.

Long. $2\frac{2}{3}$ lin.

Hab. Brazil.

Head moderately produced between the eyes, vertex longitudinally grooved; antennæ longer than the head and thorax, robust, subinerassate, two basal joints short, equal, the basal one slightly thickened, third rather longer than the second, fourth scarcely equal to the third, fifth and sixth very short, transverse, nearly equal, the sixth however being visibly shorter than the fifth, seventh nearly as long as the two preceding taken conjointly, thickened, and forming with the four terminal joints an elongated slightly-compressed club; the sutural lines between the last four joints obsolete. Thorax twice as broad as long, sides obliquely narrowed from just above the extreme base to the apex; upper surface subcylindrical in front, flattened and transversely excavated on the hinder disc, deeply impressed with large deep round punctures, which, closely crowded on the sides, are irregularly placed at much more distant intervals on the disc; whole surface of basal lobe excavated, depressed. Scutellum transverse, its apex obtuse. Elytra scarcely broader at their base than the thorax; humeral callus laterally prominent, its apex not extending beyond the lateral border, obtuse; sides gradually dilated from below their base to the hinder angles, narrowly margined, their outer edge distantly and irregularly serrate; hinder angles produced slightly outwards and obliquely upwards and scarcely backwards into a triangular plate, the upper surface of which is deeply concave, its apex obtuse, and its apical border armed with four or five coarse teeth; upper surface flattened, interspaces deeply gemellate-punctate, the first irregularly punctured at the base, a space on the outer disc just below the middle, extending between the second and fourth costæ, irregularly punctured.

5. *Uroplata terminalis.*

Elongata, apicem versus vix ampliata, subdepressa, obscure fulva, subnitida; pedibus flavis; vertice maculâ utrinque, antennis, thorace utrinque vittâ latâ laterali, abdominisque segmento ultimo, nigris; elytris apice obtusis, distincte subfortiter serratis, angulo postico parum prominulo, rotundato, utrisque tricostatis, lineâ suturali postice abbre-

viatâ, margine apicali, vittâque latâ laterali, postice abbreviatâ, introrsum late emarginatâ, obscure metallico-viridibus.

Long. $3\frac{1}{2}$ lin.

Hab. Amazons.

Head moderately produced between the eyes, vertex keeled in front, furnished posteriorly with an oblong fovea, orbital margin black; antennæ nearly half the length of the body, moderately robust, subincrassate, two basal joints nearly equal, the first thickened, the second ovate, third half as long again as the second, fourth nearly one half shorter than the third, fifth and sixth each gradually decreasing in length, four last joints nearly cylindrical, seventh one-fourth shorter than the third, slightly thickened, and together with the four following joints forming a somewhat compressed indistinct club; sutural articulations between the last four obsolete. Thorax nearly twice as broad as long at the base, narrowed from base to apex, sides distinctly bisinuate, apical angle armed with a short, curved, obtuse tooth; above subcylindrical, flattened and transversely excavated on the hinder disc; this latter portion smooth, nearly impunctate, remainder of the surface closely covered with large deeply-impressed punctures; basilar lobe broadly truncate, its surface oblique, transversely grooved. Scutellum transverse at the base, sides narrowed towards the apex, the latter obtusely truncate. Elytra broader than the thorax, narrow, subparallel in front, very slightly dilated towards the hinder angle, the latter scarcely produced; lateral border very narrow, very remotely armed with small teeth; apical border moderately dilated, its edge obtusely rounded, coarsely serrate; each elytron with three raised costæ, their interspaces deeply gemellate-punctate; interspace between the second and third costæ irregularly punctured for a short space below its middle. Black apical segment of abdomen marked on either side with a small fulvous spot.

6. *Uroplata* 16-*guttata*.

Elongata, dorso subdepressa, picea, subnitida; pedibus, antennis extrorsum, thoracis vittâ elytrorumque guttis 16 pallide fulvis; elytris utrisque tricostatis, parallelis, apice rotundatis, angulo postico obsoleto.

Long. $1\frac{3}{4}$ lin.

Hab. Brazil.

Head not produced between the eyes, vertex longitudinally grooved; antennæ short, robust, cylindrical, incrassate, gradually

increasing in thickness from their base upwards; basal joints very short, transverse, second and third nearly equal, each about one half as long again as the first; three following joints gradually decreasing in length from the third, transverse; seventh nearly equal to the two preceding united, and conjointly with the four apical joints forming a narrowly-ovate club, the sutural lines between the four latter joints obsolete, the six basal joints pitchy-black. Thorax rather broader than long, sides nearly straight behind, rounded and narrowed in front; anterior angles armed with a subacute tooth; subcylindrical above, transversely excavated on the hinder disc; surface deeply and closely impressed with large punctures, rugose on the sides; basal lobe depressed. Scutellum smooth, triangular, its apex broadly truncate. Elytra parallel, broader than the thorax, apex regularly rounded, margin narrowly dilated, serrate, sides indistinctly sinuate along their middle; each elytron with three strongly-raised costæ, their interspaces deeply gemellate-punctate.

PRIZE ESSAYS.

As an inducement to the study of Economic Entomology, and with a view to increase the practical utility of the Entomological Society, the Council offers Two Prizes of the value of Five Guineas each to be awarded to the authors of Essays or Memoirs, of sufficient merit and drawn up from personal observation, on the anatomy, economy, or habits of any insect or group of insects which is in any way especially serviceable or obnoxious to mankind. The Essays should be illustrated by figures of the insects in their different states, and (if the species be noxious) must show the results of actual experiments made for the prevention of their attacks or the destruction of the insects themselves.

On former occasions the Council has selected a definite subject, as *e. g.*, the *Coccus* of the Pine Apple, the larva of *Agrotis Segetum* (the large caterpillar of the turnip), &c. The consequence was, that competition was diminished or not called into play. On the present occasion, therefore, the selection is left to the candidates themselves, provided only that the subject be one fairly belonging to the Economic branch of Entomology.

The Essays must be sent to the Secretary at No. 12, Bedford Row, with fictitious signatures or mottoes, on or before the 31st December, 1865, when they will be referred to a Committee to decide upon their merits ; each must be accompanied by a sealed letter indorsed with the fictitious signature or motto adopted by its author, and inclosing the name and address of the writer.

The Prize Essays shall be the property of, and will be published by, the Society.

XVI. *On the Species of* Agra *of the Amazons Region.* *By* H. W. Bates, F.Z.S.

[Read 3rd April, 1865.]

The genus *Agra* is too well known to Coleopterists to render necessary a detailed description in this place. It is composed of a series of elongated forms of metallic colouring, belonging to the *Truncatipennes* division of the great tribe *Carabici;* and in Lacordaire's system constitutes, with *Calleida*, *Cymindis* and many allied genera, the first Group of the *Lebiides: Dromius* forming the type of the second Group, and *Lebia* of the third Group of the same Family (or as he terms it *Tribu*, in accordance with the French nomenclature of assemblages of genera). As a genus *Agra* is distinguished from its nearest relative *Calleida* by the head being constricted behind and forming a distinct neck, and by the mentum having a strong tooth in the middle of its emargination. Both genera have the terminal joint of the labial palpi hatchet-shaped, and also strongly-bilobed penultimate joints to the tarsi, and claws thickened and pectinated. The form of the prothorax, which is not usually admitted in the *Carabici* as offering generic characters equal in value to those furnished by the oral organs and tarsi, is a leading feature in distinguishing *Agra* from *Calleida* and the other allied genera, and is the character which, combined with the form of the head, gives the *Agræ* their peculiar facies; this part of the body having an elongate conical shape instead of presenting a distinct, more or less plane, pronotum, quadrate or cordate in outline. It is, moreover, always sculptured, the mode of punctuation being common to series of allied species, so as to admit of serving as a character to group them into natural subordinate assemblages.

Of the genera familiar to European Entomologists, *Cymindis* is the nearest related to this favourite tropical group. An American genus recently separated from *Cymindis*, namely, *Apenes* of Leconte, forms a still nearer approximation, as it presents bilobed penultimate tarsal joints. But the *Cymindes* differ greatly from the *Agræ*, in facies, in the form of the claws, and also in habits, being terrestrial species found under stones and about the roots of herbage, at most climbing the stems of shrubs, whilst the *Agræ* are wholly arboreal. In this they are like the *Calleidæ*, but the

Calleidæ are all diurnal insects, and are seen actively coursing up and down the stems and the foliage of shrubs and trees in the day-time, whilst the *Agræ* are scarcely ever thus seen, being found (with only one exception known to me) concealed in curled-up leaves, and motionless in the day-time. The *Calleidæ* are found in the tropical and subtropical zones over the whole earth, but the *Agræ* are peculiar to tropical America, and they increase in number of species in approaching the line of the Equator. They are the most purely arboreal in their habits of life of all the related genera, it might be said even of all the *Geodephaga;* their broad tarsi with brushy-palms and divergent pectinated claws adapting them for clinging to stems and foliage as beautifully as the similar structures in Chrysomelideous insects do in the case of those purely phytophagous tribes. The *Agræ* prey doubtlessly on the small larvæ and soft-bodied insects which abound in the masses of adherent and interwoven or folded leaves of the trees on which they are found; but being seen almost always motionless by day, and therefore probably nocturnal feeders, I never had the opportunity of observing them in the act of feeding.

There is very little else to be recorded of the habits of these elegant and most interesting insects. I have noticed, however, that they possess the crepitating power, which exists in so many other genera of the Section and reaches its acme in *Brachinus* and *Pheropsophus*. It is however very feeble, the explosion being not audible and perceptible only when the insects are held by the fingers near the posterior part of their bodies, when a slight explosion is felt, producing a sensation of warmth in the fingers, followed by a temporary stain diffused by the acid over the hinder part of the elytra.

Although it has always been a favourite group with collectors, the *Agræ* have been, until recently, great rarities in European cabinets; Count Dejean, up to the year 1837 (the date of his last Catalogue), possessed only 13 species. The German collections, however, were much richer, chiefly owing to the assiduity with which several German collectors, who were encouraged to travel in Brazil on the marriage of the Emperor of that country with an Austrian Archduchess in 1817, searched for the rarer species of various groups of insects. One of these was Sieber, valet to Count Hoffmannsegg, whose master sent him to Pará to collect, where in a short time he gathered some of the choicest species. Klug, in consequence, was able in 1824 to describe and enumerate 20 species, most of which were represented in the Berlin Museum; and in 1834 (in his Jahrbücher) he increased

the number to 28. Since then, the researches of numerous collectors in Brazil and New Granada, Moritz in Venezuela, Sallé in Mexico, Bar in Cayenne, and myself in the region of the Amazons, have enabled the Baron de Chaudoir, our best authority on the genus, to examine himself and describe 87 species, which added to others described by various authors, but unknown to M. de Chaudoir, make a total of 124 species described up to the present time. To this number I am enabled to add, in the following pages, 16, in addition to the large number previously described by M. de Chaudoir from my collection, which advances the number of known species to 140. The general rarity and retiring habits of the *Agræ*, together with the extreme narrowness of the range of most of the species, lead us to think that even this large number will eventually be greatly augmented, so that *Agra* will become one of the most numerous genera of the *Geodephaga*. The species form a most difficult study; this, however, is saying little, for in the present state of the science all the large groups of the *Geodephaga* are in the same predicament; the slight but sure differences in the general form, colour and sculpture, outline of head and thorax, requiring great labour and patience, and a well-trained eye, to discriminate one species from another. That the great majority of *Agræ* so discriminated are perfectly sound species I have no doubt whatever, this conclusion being grounded on the evident physiological and permanent separation of several of their closely-allied species which I found inhabiting one and the same locality. Such species as *A. varians* and *A. cytherea*; *A. chalcoptera* and *A. biseriata*, are cases in point: the absolute structural characters which separate these are detected only by a practised eye, but they are constant, and the two groups of individuals in each case show, by the absence of connecting forms, their physiological separation, or, in other words, the absence of intercrossing. In other cases the closely-allied forms inhabit distant localities; the physiological test is not then applicable, and we have to decide on their probable distinctness from the analogy of the other cases. Some few species remain of which single specimens only were found; these are described as distinct only when there is a certainty, or at least great probability, of their being so. When much doubt existed I have preferred describing them as doubtful varieties, under the head of the next-allied species.

In the *Agræ* well-marked secondary sexual characters, in most cases, offer excellent characters for distinguishing closely-allied species. The genus is remarkable amongst the *Carabici* on this

account. In the great majority of genera of *Carabici*, as is well known, the males are distinguished from the females by the dilatation of the anterior and sometimes of the middle tarsi; the number of joints dilated and the nature of the clothing of the palms affording characters whereby to distinguish genera and subfamilies. But the other parts of the body offer only very slight differences in the sexes. In the *Agræ* the differences are numerous and varied. In some species the anterior tarsi show a dilatation of the first joint in the male; and in others it is the hind feet that exhibit this partial enlargement: the femora in the males of nearly all are strongly thickened; and in one series of species the middle and hind tibiæ are peculiarly bent and flattened, and hirsute on their inner side in the same sex. This latter character is accompanied in the same species by dense patches of hairs arising from closely-punctured spaces in the middle of the metasternum and abdominal segments. Some species again possess this hairy clothing, without the existence of any peculiarity in the shape of the tibiæ: this clothing in others often extends to the bases of the femora and the hind trochanters. In all the species whose males are thus clothed the under surface of the body of the females is naked and the tibiæ simple; but in a numerous group this sex offers a singular peculiarity in the antennæ; the eighth to tenth joints being out of proportion shorter than the rest, and the eighth generally extremely abbreviated. The males also have generally more broadly dilated palpi, as is the case in the *Carabi* and other genera having these organs hatchet-shaped. There is this to be noted, however, in the genus, that, whilst some species show these sexual differences in a high degree of perfection, there are others in which they are reduced almost to *nil*.

The Baron Chaudoir, in his chief work on the *Agræ*, published in the Annals of the Entomological Society of France, 1861, has divided the genus into two, viz. *Agridia* and *Agra*. *Agridia* is a tolerably natural group, and may be adopted or not according as the student has analytical or synthetical tendencies, but the sharpness of its definition from *Agra* is much affected by the intermediate character of the first group of the latter genus (the *Agræ spuriæ* of Chaudoir). I have followed M. de Chaudoir in the subordinate grouping of the genus, which seems to me most natural.

Lastly, I may say, by way of hint to future collectors in Tropical America, that the best season for *Agræ* is the showery weather at the commencement of the rainy season, especially if the preceding dry period has been of long duration. When the

weather is, however, very showery, it is of little use hunting for them; and it is only in certain peculiar states of the weather that more than a solitary specimen can be found in a day's search. When the season seems to be favourable to them, beating should be resorted to, and then by perseverance a good series of specimens may be obtained of many species in a few days. All kinds of forest yield them; the dry scattered woods and the lofty virgin forests containing each their peculiar species; in the former they are small in size, the large and handsome kinds being found only in the more luxuriant parts of the great wilderness.

Baron Chaudoir, who described in his paper above mentioned all the new species of mine of which I could afford him duplicates, has since kindly compared the remaining species with his own rich collection, and given me manuscript descriptions of many of them. Out of the forty-seven species of *Agridia* and *Agra* here recorded as found in the Amazons region, forty-two were found by myself, and of these thirty-one were new species.

Genus Agridia, Chaudoir.

Mentum lobis valde angustis, acutissimis, intus acute carinatis. *Tibiæ* compresso-dilatatæ. *Tarsi* supra glabri, articulis latis brevibus, compressis, subquadratis; unguiculis brevissimis.

1. *Agridia Batesii*, Chaudoir.

Agridia Batesii, Chaud. Ann. Soc. Ent. Fr. 1861, p. 111.

A. subcylindrica, nigra, nitida, thorace supra viridi- vel violaceo-tincto, elytris lætissime viridibus; capite angustato, postice elongato, sensim attenuato; thorace angustato, antice attenuato, dorso convexo, punctato, transversim strigoso, lateribus haud carinatis; elytris angustis, cylindricis, humeris rotundatis, apice truncatis, apud suturam dehiscentibus, angulis suturalibus acutis, exterioribus in dente productis, punctato-striatis, punctis transversis, confertis.

♂ Segmentis ventralibus medio punctatis et fusco-hirsutis; segmento apicali medio inciso.

♀ Abdomine glabro, segmento apicali leviter emarginato; antennarum articulis 7-10 reliquis brevioribus.

Long. 6½—8 lin. ♂ ♀.

Ega.

This very handsome species was seen only on the foliage of low trees unconcealed, and seems to be of diurnal habits.

2. *Agridia phœnicodera*, n. sp.

A. subcylindrica, postice paulo dilatata, nigra, nitida; thorace violaceo, lateribus cupreis; elytris lætissime viridibus; capite angustissimo, postice valde elongato, haud attenuato.

♀ Antennarum articulo 8vo sequentibus multo breviori.

Long. 5 lin. ♀.

Very similar to *A. Batesii*, the difference in the shape of the head and in the length of the eighth antennal joint in the ♀ being the only characters which induce me to believe it a distinct species. The head is much narrower and longer in proportion to its width than in the corresponding sex of *A. Batesii*; indeed there is no other species in the genus known to me which can be likened to it in point of narrowness, its greatest width not much exceeding that of the anterior part of the thorax. As in *A. Batesii*, it is greatly prolonged behind the eyes, but its sides are not straight, as in that species, but a little bowed outwards, and it is not perceptibly narrowed to the neck. The thorax differs from that of *A. Batesii* in its colour being violet, passing into brilliant purple copper on the sides; the surface is not perceptibly wrinkled, and the punctures are in many parts confluent. The elytra are of the same rich silky metallic-green as in *A. Batesii*.

Ega. On foliage, one example.

3. *Agridia platyscelis*, Chaudoir.

Agridia platyscelis, Chaud. Ann. Soc. Ent. Fr. 1861, p. 110.

A. angustata, postice paulo ampliata, nigra, nitida, elytris æneo-olivaceis, pedibus palpisque apice piceo-rufis; capite elliptico, glabro, pone oculos valde elongato, vertice convexo; antennarum articulis apice setosis; oculis vix prominentibus; thorace capite paulo breviori, antice attenuato, subtus glabro, supra transversim strigoso et postice sparse punctato, lateribus lineatim punctatis et carinatis; elytris pone basin leviter sinuatis, postea ampliatis, apice truncatis, angulis exterioribus in dente productis, humeris rectangulatis; dorso punctato-striatis, punctis transversis et confertis.

Long. 11 lin. ♀.

Ega. Concealed in folded leaves on trees in the depth of the forest; extremely rare. I met with females only; in this sex the eighth to eleventh joints of the antennæ are much shorter and more slender than the preceding.

Genus Agra.

Mentum lobis apice rotundatis, intus haud carinatis. *Tibiæ* non compressæ, teretes. *Tarsi* supra pilosi, articulis subelongatis, haud compressis, cordatis aut trigonis; unguiculis minus brevibus.

A. Mentum lobis longioribus, angustis, apice subacute rotundatis.

1. *Agra erythropus*, Dejean.

Agra erythropus, Dej. Spéc. Gén. i. 199.

„ „ , Chaud. Ann. Soc. Ent. Fr. 1861, p. 112.

A. robusta, obscure ænea; capite ovali, postice modice elongato, rotundato-attenuato, oculis valde prominentibus; thorace antice subito attenuato, lateribus carinatis, episternis valde convexis, supra planis, sparsim punctatis; elytris humeris obliquis, pone medium ampliatis, apice peroblique truncatis, angulis suturalibus acutis, externis dentiformibus, dorso profunde punctato-striatis; antennis pedibusque rufescentibus; tibiis latis, compressis, angulis externis terminalibus haud prominulis; intermediis apice intus dilatatis.

Long. 10 lin. ♂

♂ Segmentis ventralibus punctatis, sparsim hirsutis; segmento terminali dorsali inciso, ventrali late triangulariter emarginato; pedibus robustis, tarsis latis, articulo ultimo brevi, posticorum primo intus valde rotundato-dilatato.

Villa Nova, Lower Amazons. On foliage. It is on the authority of Baron Chaudoir that I refer the example I possess of this species to *A. erythropus* of Dejean, the description of this author presenting no means of identifying the species with certainty. M. de Chaudoir, who possesses the type specimens of Dejean, was acquainted only with females of this and the other species of section A.

2. *Agra latipes*, Chaudoir.

Agra latipes, Chaud. Ann. Soc. Ent. Fr. 1861, p. 112.

A. nigra, nitida, elytris æneo-tinctis; capite ovali, angustato, pone oculos elongato, leviter rotundato-attenuato; thorace antice angustato, lævi, medio linea impressa utrinque punctato, lateribus carinatis, episternis modice convexis; elytris postice paulo ampliatis, apice peroblique truncatis, angulis suturalibus acutis, externis dentiformibus, dorso grosse punctato-striatis, punctis partim confluentibus; tibiis compressis.

♂ Segmentis ventralibus medio crebre punctatis, dense fusco-

hirsutis; femoribus (præsertim posticis) validioribus, tarsis latioribus, posticorum articulo basali sequentibus multo majori, intus rotundato-dilatato.

♀ Antennis articulis 8-10 abbreviatis, 8vo brevissimo.

Long. 7—9 lin.

This species occurred more frequently than the preceding. I met with it, however, only at Ega, about the commencement of the rainy season.

B. Mentum lobis latis, breviusculis, apice late rotundatis.

a. Elytris foveolatis.

a. Capite elongato-ovato.

3. *Agra ænea*, Fabricius.

Agra ænea, Fab. Syst. Eleuth. i. p. 224, n. 1.
„ „ , Dej. Sp. i. p. 198, n. 1.
„ „ , Chaud. Ann. Soc. Ent. Fr. 1861, p. 113.

A. elongata, ænea, nitida; capite ovato, postice rotundato-attenuato, glaberrimo; prothorace supra grosse punctato, postice coarctato; elytris lineatim confluenter foveolatis, apice oblique subsinuato-truncatis; pedibus piceo-cupreis.

♂ Coxis posticis segmentisque ventralibus medio confertim punctatis et pilosis.

♀ Antennis articulo 8vo valde abbreviato.

I captured one individual of this species on a low tree in the forest, at Manaos, on the Rio Negro. It is an inhabitant of Cayenne.

4. *Agra metallescens*, Chaudoir.

Agra metallescens, Chaud. Bull. Mosc. 1847, ii. p. 95, n. 12.

This species, of which the female only is known, is closely allied to *A. ænea*, but differs conspicuously in its darker bronze colour. M. de Chaudoir possesses two examples from Pará. I do not recollect taking the insect myself; and the collections which I made in the neighbourhood of Pará, in the years from 1848 to 1850, were sent to England without my reserving a set of the Coleoptera.

5. *Agra Megera*, Thomson.

Agra Megera, Thomson, Arch. Ent. i. p. 399.
„ „ , Chaud. Ann. Soc. Ent. Fr. 1861, p. 113.

A. elongata, robusta, nigra, supra oblivaceo-ænea; capite oblongo, pone oculos subquadrato, basi subito constricto; thorace capite vix longiori, grosse confluenter punctato, inter-

stitiis glabris, elevatis ; elytris regulariter lineatim foveolatis, apice oblique flexuoso-truncatis, angulis suturalibus productis; tarsis elongatis, fulvo-hirsutis.

♂ Mesosterno et segmentis ventralibus (apicali excepto) punctatis et longe fulvo-hirsutis ; femoribus crassis, tibiis intermediis intus pone medium unco armatis, posticis medio angulatis et intus dente instructis, pone medium intus hirsutis ; tarsis haud dilatatis.

♀ Pedibus teretibus, mesosterno abdomineque glabris ; antennis articulo 8vo valde abbreviato.

Long. 11—13 lin.

This is the largest known species of the genus, and is at once distinguishable from its nearest relatives by the quadrate shape of the head in both sexes. I met with it only at Ega, where it occurred sparingly on leaves of trees in the forest. Baron Chaudoir was unacquainted with the true male at the date of his monograph quoted above, and described that sex of an allied species, our *A. anguinea*, as the male of *A. Megera*.

6. *Agra anguinea*, n. sp. (Pl. XX. fig. 6, ♂.)

A. Megeræ formâ et colore simillima, sed minor ; capite multo angustiori, haud quadrato, parte postica quam thoracis apice vix latiori, pone oculos leviter attenuato ; thorace medio paulo dilatato.

♂ Trochanteribus posticis segmentisque ventralibus medio dense, mesosterno medio sparsim, punctatis et pilosis ; tibiis intermediis prope apicem intus dentatis; posticis a medio usque ad apicem intus incrassatis et pilosis ; femoribus validioribus.

♀ Pedibus teretibus ; antennis articulo 8vo valde abbreviato.

Long. 10½—11 lin.

Found also at Ega, in the same situation as *A. Megera*. The great differences in secondary sexual features between the males of this form and of *A. Megera* forbid their being classed as belonging to the same species; for it has been generally allowed by attentive students that these characters offer the best guides in distinguishing species, and they may well be so considered, since marked sexual differences afford strong presumption of the non-existence of intercrossing, the surest indication of persistent separation between closely-allied forms. I should not, however, be surprised at intermediate forms of the male sex being found between *A. Megera* and *A. anguinea*, or any other similarly-related species.

7. *Agra infuscata*, Klug.

Agra infuscata, Klug, Entom. Monogr. p. 15, pl. i. fig. 3.

A. angustior, elongata, nigro-ænea, pedibus interdum rufescentibus; capite (♂) pone oculos conico, (♀) rotundato-attenuato; thorace grosse rugoso-punctato; elytris apice oblique truncato, angulis suturalibus acutis, haud productis nec reflexis, dorso lineatim foveolato.

♂ Femoribus validioribus, tarsorum anticorum articulo basali magno, dilatato; mesosterno, trochanteribus posticis, segmentorum ventralium plagis duabus, confertim punctatis et pilosis; tibiis intermediis prope apicem intus dente parvo armatis, posticis pone medium leviter dilatatis, hirsutis.

♀ Pedibus abdomineque simplicibus; antennis articulo 8vo brevissimo.

Long. 9½—10 lin.

Pará, Santarem (banks of Tapajos) and Ega, Upper Amazons. This species differs from *A. anguinea* in pretty nearly the same degree as the latter does from the giant *A. Megera*. It has a wide range; I have specimens before me from localities 1,100 miles apart in a straight line from east to west.

8. *Agra reflexidens*, Chaudoir.

Agra reflexidens, Chaud. Ann. Soc. Ent. Fr. 1861, p. 114.

A. elongata, nigro-ænea, foveolis elytrorum viridi-nitentibus; capite maris robustiori, feminæ angustiori, ovali, pone oculos sensim attenuato; thorace ut in *A. anguinea* et *A. infuscata*, interstitiis paulo latioribus, lævissimis; elytris apice oblique truncatis, angulis suturalibus valde productis, dentiformibus, paulo reflexis.

♂ Femoribus validioribus; segmentis ventralibus intermediis medio punctatis et pilosis; tibiis intermediis intus flexuosis, apice subito dilatatis, posticis pone medium vix hirsutis.

♀ Antennis articulo 8vo valde abbreviato; pedibus abdomineque simplicibus.

Long. 9½ lin.

Ega. In the same situations as the three preceding species, and once taken *in copulâ*. The prolongation of the sutural angle is a good character whereby to distinguish this species, as it exists in both sexes; it forms a distinct tooth or spine owing to its length and to the truncation being a little sinuated or incurved as it approaches the angle.

9. *Agra mustela*, n. sp.

A. angustata, antice valde attenuata, nigro-ænea, antennis piceo-rufis, articulis apice nigris; capite angusto, maris pone oculos conico vel in lineis rectis attenuato, feminæ elliptico vel leviter rotundato-attenuato; thorace gracili, grosse punctato, spatiis magnis lævibus, episternis haud convexis, punctis grossis sparsis; elytris pone basin sinuatis, deinde ampliatis, apice truncatis, angulis suturalibus vix acutis, dorso lineatim foveolatis.

♂ Metasterno sparsim, trochanteribus segmentisque ventralibus plagiatim dense punctatis et longe fulvo-pilosis; tibiis intermediis et posticis intus densissime hirsutis, his medio leviter angulatis, illis prope apicem dente parvo instructis; femoribus validioribus.

♀ Antennis articulo 8vo valde abbreviato; pedibus abdomineque simplicibus.

Long. 8 lin.

Ega. In the same situations as the preceding. It differs from *A. infuscata*, to which it is most closely related, by its smaller size and the less oblique truncation of the elytra, which causes the sutural angle to be less acute than in the allied species. The male differs from the corresponding sex of *A. infuscata* by the almost glabrous metasternum. These points of difference, it must be confessed, are much less important than those which separate the rest of these allied forms, and it is not without hesitation that I have described the present one as distinct.

10. *Agra femorata*, Klug.

Agra femorata, Klug, Entom. Monogr. p. 36, pl. ii. fig. 8.

A. elongata, subcylindrica, nigerrima, foveolis elytrorum viridi-punctatis; capite elongato-ovali, pone oculos rotundato-attenuato; thorace subcylindrico, prope apicem subito angustato, supra lævi, punctis lineatim ordinatis, episternis sparsim punctatis; elytris postice minime ampliatis, apice transversim utrinque bisinuato-truncatis, tridentatis, dorso lineatim foveolatis, foveolis hic illic confluentibus.

♂ Metasterno leviter, segmentis ventralibus 2—4 utrinque plagis dense punctatis et pilosis; tibiis intermediis et posticis apices versus intus breviter hirsutis, his medio leviter incrassatis, illis prope apicem dentatis; femoribus validioribus.

♀ Antennis articulo 8vo abbreviato; elytris dente truncaturæ mediano breviori.

Long. 6—8½ lin.

Baron Chaudoir has communicated the following note on this species, founded on the specimens brought home by me:—

"La description de Klug convient très-bien aux individus que j'ai sous les yeux, et je ne doute point qu'ils ne se rapportent à cette espèce, mais Klug a tort de dire que le ventre est lisse et glabre, car la poitrine du mâle est pointillée et pubescente sur le milieu et les avant-derniers segments de l'abdomen offrent près du milieu deux touffes de poils longs (surtout les deux antérieurs), séparés par un espace glabre mais finement rugeux. La femelle seule est lisse. Villa Nova et Obydos."

I beat a pair of this species, *in copulâ*, out of a flowering bush at Villa Nova, on the lower Amazons.

11. *Agra scrutatrix*, n. sp.

A. mœrenti formâ et sculpturâ simillima; differt elytris lineâ rectâ truncatis, antennis articulo 8vo (♀) brevissimo. Nigro-ænea, thorace pedibusque æneo-piceis; capite elliptico, thorace gracili, elytris angulis suturalibus leviter productis, externis acute dentiformibus.

♀ Antennis articulis 8—11 reliquis brevioribus, haud gracilioribus, 8vo sequenti dimidio breviori.

Long. 7 lin.

Ega. One example. M. de Chaudoir gave it as his opinion that this was simply a variety of *A. mœrens*. The great difference in the truncation of the elytra and the relative length of the eighth antennal joint compel me to consider it a very distinct form.

12. *Agra mœrens*, Chaudoir.

Agra mœrens, Chaud. Ann. Soc. Ent. Fr. 1861, p. 119.

A. femoratæ simillima, minor, nigra, viridi-æneo tincta, pedibus piceo-nigris; capite angustiori, elliptico; elytris in utroque sexu postice ampliatis, foveolis passim discretis, apice utrinque transversim bisinuato-truncatis, tridentatis, dente suturali haud producto.

♂ Metasterno glabro, segmentis ventralibus 2-3 medio utrinque punctatis et sparsim pilosis; tibiis posticis medio leviter angulatis, pone medium breviter hirsutis.

♀ Antennis articulis 8-11 gracilibus, 8vo sequenti paulo breviori.

Long. 7—8 lin.

Ega. Concealed in leaves of trees in the forest.

13. *Agra callictis*, n. sp.

A. gracilis, nigra, pedibus pallide flavis, geniculis tibiisque apice nigris, tarsis rufescentibus; capite elliptico; thorace angusto, dorso lævi, lineatim punctato, episternis grosse punctatis; elytris postice paulo ampliatis, apice flexuoso-truncatis, angulis suturalibus haud productis, supra lineatim foveolatis, foveolis partim viridi-tinctis; antennis gracilibus, rufescentibus, nigro-maculatis.

♀ Antennis articulis 8-10 præcedentibus minoribus, 8vo sequenti quarta parte breviori.

Long. 7 lin.

I found this extremely elegant and rare species only at Pará. M. de Chaudoir, on the examination of my specimen, concluded it to be the female of *A. geniculata* of Klug, but the difference in general form is far greater than that which exists between the sexes of all other species whose legitimate partners are known, and besides the colour of the legs differs considerably.

14. *Agra geniculata*, Klug.

Agra geniculata, Klug, Entom. Monogr. p. 30, pl. ii. fig. 4.

A. robustior, nigra, pedibus saturate flavis, geniculis, tibiis apice tarsisque nigris, antennis nigris; capite elongato, pone oculos conico; thorace medio subdilatato, postice valde constricto, antice subito angustato, dorso interstitiis latis lævibus, episternis sparsim punctatis; elytris lineis foveolarum in striis subimpressis, foveolis viridi-tinctis, apice subflexuoso-truncatis, angulis suturalibus haud productis.

♂ Metasterno medio, segmentis ventralibus 1-3 utrinque spatiis exiguis punctatis et sparsim pilosis; tibiis simplicibus, tarsis nigro-hirsutis.

Long. 7 lin.

Santarem. Beaten from bushes on the borders of woods. I believe I also found this species at Pará in the early years of collecting.

15. *Agra subænea*, Chaudoir.

Agra subænea, Chaud. Ann. Soc. Ent. Fr. 1861, p. 120.

A. valde angustata, nigro-ænea, elytris cuprescentibus; capite angusto, pone oculos elongato, lateribus rotundato, vix attenuato, apud collum subiter constricto; thorace gracili, antice sensim attenuato, lineatim punctato, interstitiis latis lævibus,

episternis confertim punctatis; elytris angustis, pone medium paulo ampliatis, apice flexuoso-truncatis, angulis externis solum dentiformibus; supra lineatim foveolatis, apices versus striatis.

♀ Antennis articulo 8vo sequenti non breviori.

Long. 5½ lin.

Hab. Ega.

♂ (?) Robustior, colore obscurior; capite latiori, thorace punctis majoribus, confluentibus; abdomine glabro, pedibus simplicibus, femoribus paulo validioribus.

Long. 5½ lin.

Hab. Pará.

Baron Chaudoir described this species from a female, agreeing in every respect with a second example of the same sex in my collection. I have no specimen of the male from the same locality, but believe the one found at Pará and described above belongs to the same species. I met with single individuals of the same or closely-allied species at other localities; it is impossible to decide whether they are distinct or not until further material is obtained. Meantime the following diagnoses may be useful:—

(a.) *A. Chryseis*, ♀.

Major, nigro-ænea; elytris læte æneis, antennis pedibusque rufescentibus; thorace ut in *A. subænea*, elytris truncaturâ vix flexuosâ, foveolis minoribus.

Long. 6½ lin.

Hab. Santarem.

(b.) *A. curtula*, ♂.

Minor, robustior, nigro-ænea, elytris æneo-cupreis; capite thorace latiori, oblongo-quadrato, angulis posticis rotundatis; thorace prope apicem attenuato, dorso grosse rugoso-punctato, episternis plagiatim punctatis; elytris truncaturâ prope angulum externum sinuatâ, deinde usque ad suturam rectâ, foveolis plurimum confluentibus; antennis immaculatis pedibusque rufescentibus; abdomine glabro, pedibus simplicibus.

Long. 5 lin.

Hab. Villa Nova.

A. gracili affinis, (Lucas, Voy. de Castelnau, Entomologie, pl. ii. fig. 6, a.)

If these two are to be considered as belonging to the same species as *A. subænea*, I think it will be necessary to combine all three with *A. ruficornis* of Klug, which is also an inhabitant of

Pará. *A. ruficornis* seems to differ from the typical *subænea* only in its larger size and duller colouring. The following diagnosis, condensed from the description of Klug, will serve to facilitate comparison:—

(c.) *A. ruficornis*, Klug, Entom. Monogr. p. 33, pl. ii. fig. 6.

Valde attenuata, nigro-ænea, foveolis elytrorum violaceo-æneis, antennis pedibusque rufo-piceis; capite perangustato, thorace profunde et irregulariter punctato; elytris apice truncatis, tridentatis, dente externo acuto, secundo approximato obtuso, interno obtusissimo.

♀ Long. 6½ lin.

Hab. Pará.

16. *Agra femoralis*, Chaudoir.

Agra femoralis, Chaud. Ann. Soc. Ent. Fr. 1861, p. 120.

A. angustata, ænea, elytris cuprescentibus, antennis (articulo basali piceo excepto), tibiis tarsisque testaceo-rufis, femoribus piceis, nitidis; capite angusto-ovato, pone oculos minus elongato, rotundato-attenuato, oculis magnis; thorace angusto, antice sensim attenuato, grosse punctato, interstitiis glabris, tenuibus; elytris postice vix ampliatis, truncaturâ prope angulum externum sinuatâ angulum medianum formante, deinde usque ad suturam fere rectâ; elytris foveolis in striis impressis ordinatis.

♂ Metasterno, tibiis segmentisque ventralibus fere glabris; tarsis anticis articulo basali a basi dilatato.

Long. 6½ lin.

Ega.

The species was not uncommon, but I have neglected to reserve specimens of both sexes for my own collection.

17. *Agra tibialis*, Chaudoir. (Pl. XX. fig. 2, ♀.)

Agra tibialis, Chaud. Ann. Soc. Ent. Fr. 1861, p. 121.

A. femorali formâ, colore et sculpturâ similis; major, elytris oblique subflexuoso-truncatis, nullomodo bisinuatis; ænea, antennis tibiis tarsisque rufescentibus, femoribus nigro-piceis; corpore subtus utroque sexu glabro.

♂ Tarsis anticis articulo primo abrupte dilatato.

♀ Tarsis anticis articulo primo simplici, antennis articulo 8vo nullomodo abbreviato.

Long. 8—9 lin.

Widely distributed over the Amazons region; being found at Pará and at Ega. In a Pará example before me the femora are pitchy-rufous and the elytra more coarsely foveolated than in the Ega specimens.

β. Vertice utrinque pluripunctato piloso.

18. *Agra mœsta*, Chaudoir.

Agra mœsta, Chaud. Ann. Soc. Ent. Fr. 1861, p. 123.

A. robusta, nigra, nitida; capite ovali, pone oculos rotundato-attenuato, pluripunctato; thorace medio dilatato, antice valde subito attenuato, supra grosse lineatim confluenter punctato; elytris truncatis, angulis suturalibus et externis valde productis, supra alternatim striato-punctatis et striato-foveolatis; antennis pedibusque piceo-nigris.

♀ Antennis articulo 8vo nullomodo abbreviato.

Long. 8½—9½ lin.

Ega.

b. Elytris distincte punctato-striatis.

a. Thorace toto dense punctulato.

19. *Agra pulchella*, Chaudoir.

Agra pulchella, Chaud. Ann. Soc. Ent. Fr. 1861, p. 126.

A. nigro-ænea, elytris cupreis, nitidis, certo situ viridi-micantibus; capite ovali, postice elongato, rotundato-attenuato, occipite lineola impressa; thorace subcylindrico, prope apicem subito attenuato, punctulato, linea impressa antica dorsali, lateribus tenuiter carinatis, episternis crebre punctulatis, glabris; elytris apice truncatis, angulis externis leviter productis, suturalibus acutis, dorso punctulato-striatis, interstitiis planis; antennis rufescentibus.

♂ Metasterno, segmentis ventralibus (anali excepto), medio laxe punctatis et pilosis.

♀ Corpore subtus glabro; antennis normalibus.

Long. 4—4½ lin.

Ega.

20. *Agra brevicollis*, Klug.

Agra brevicollis, Klug, Entom. Monogr. p. 25, pl. i. fig. 9.

A. nigro-ænea, elytris cupreis, certo situ viridi-micantibus; capite angustato, postice rotundato-attenuato; thorace brevi, subconico, prope apicem subito attenuato, supra lineola dorsali impresso, punctulato, punctis sæpius confluentibus, subtus

distinctius punctulatis ; elytris truncatis, dente externo acuto, interno obtuso.

♂ Segmentis ventralibus medio cinereo-tomentosis ; metasterno sub-hirto.

Long. $5\frac{1}{2}$ lin.

Pará. This species, which I did not myself meet with, is evidently closely allied to *A. pulchella ;* it is larger, however, and the ventral segments are much more densely pilose in the male.

21. *Agra Chaudoirii*, n. sp.

M. de Chaudoir has kindly drawn up for me the following description of this species :—

" Nigra ; thorace nigro-æneo ; elytris rubro- aut virescenti-cupreis, anguste viridi-marginatis, fulgentibus ; antennis extus piceis, articulis singulis nigro-terminatis. Caput elongato-ovatum, subangustum, basi sat abrupte strangulatum, læve, basi uni-foveolatum, utrinque unipunctatum, oculis sat prominulis. Thorax quoad formam ut in *A. Cytherea*, capite longior, eoque cum oculis fere crassior, latitudine duplo longior, parce pilosus, ovatus, crassiusculus, antice breviter attenuatus, lateribus ad apicem brevissime, ante basin obsolete sinuatis, totus sat dense regulariterque punctatus, carinula laterali subelevata, utrinque subcrenata, integra. Elytra fere omnino ut in *A. Cytherea*, thorace antice fere duplo latiora, posterius ampliata, modice elongata, apice suboblique truncata, bidentata, dente externo acuto, suturali subproducto, obtuso, intra dentem externum subsinuato ; supra modice convexa, sat tenue punctato-striata, interstitiis planiusculis, punctorum seriebus in 3° et 5° fere obsoletis. Femora ♂ valida, pectore medio et vitta latiuscula abdominis fere ad apicem dense pubescente-punctulatis. Femina subtus glabra, pube murina."

Long. $6\frac{1}{2}$ lin.

Ega. In the Collections of Baron Chaudoir and H. W. Bates.

22. *Agra bicostata*, n. sp.

The following is a description of this species drawn up by M. de Chaudoir :—

" Præcedenti valde similis, eadem magnitudo, color idem ; differt capite paulo angustiori, basi minus abrupte strangulato, thorace antice brevius attenuato, costa laterali evidentiori, et

fere duplici, supra medio apice breviter costato; elytra similia, paulo minora, apice acute tridentata, dente suturali sat producto, intermedio minore, apice haud rotundato; antennis articulis singulis apice haud nigrescentibus; ♂ abdomine subtus basi glabra, segmentis tribus ultimis medio tantum pubescentibus."

Long. 6 lin.

Ega. Collections of Baron Chaudoir and H. W. Bates.

23. *Agra brevicornis*, n. sp.

"Præcedenti primo intuitu similis, minor. Caput subelongato-quadratum, basi abrupte quadrato-constrictum, læve, basi unifoveolatum et utrinque unipunctatum; oculis sat prominulis. Thorax quoad formam non differt, attamen paulo brevior, supra minus confertim et sat irregulariter punctatus, supra medio apice subtricostatus, carina laterali elevata, integra, exteriori subobsoleta. Elytra paulo breviora, nec latiora, minora, similiter punctato-striata, apice recte truncata, dentibus non prominulis, nec rotundatis. Antennæ breviores, thoracis basin vix attingentes, articulis tribus basalibus nigris, cæteris rufis. Color obscure cupreus." (Chaudoir.)

Long. 5½ lin. ♀

Pará. One example in my own Collection.

24. *Agra rubrocuprea*, n. sp.

M. de Chaudoir has given me the following description of my specimens of this species:—

"*A. œneipenni* certe affinis, differt capite evidenter latiori, magis rotundato, oculis sat prominulis, thorace paulo minus elongato, antice brevius attenuato, ante basin vix strangulato, costa laterali magis elevata; elytris basin versus minus attenuatis, magis parallelis, apicis angulo suturali subacutiore. ♂ subtus pectore medio, abdominisque toti fere ad apicem vitta lata media pubescenti-punctulatis, pube murina; ♀ glabra; colore nigro-picea, nitida, thorace virescenti, elytris rubro-cupreis, splendidis; antennæ extus ferrugineæ, articulis singulis nigro-terminatis; pedes rufo-picei: ♂ ris femora parum incrassata."

Long. 4½ lin.

This brilliant little species occurred only at St. Paulo, and was very rare. Coll. Baron Chaudoir and H. W. Bates.

25. *Agra æneipennis*, Chaudoir.

Agra æneipennis, Chaud. Ann. Soc. Ent. Fr. 1861, p. 127.

A. pulchellæ similis; gracilis, nigro-ænea, thorace elytrisque subobscure viridi-æneis; capite angustato-oblongo, pone oculos modice rotundato-attenuato, vertice foveola impresso; thorace elongato, postice coarctato, apicem versus subito attenuato, omnino punctulato; elytris gracilibus, intra dentem externum valde sinuatis, supra punctato-striatis; antennis rufescentibus.

♂ ♀ subtus glabra.

Long. 4½ lin.

Ega. Coll. Baron Chaudoir and H. W. Bates.

26. *Agra aurata*, n. sp.

A. rubrocupreæ similis, differt capite magis ovato, thorace medio crassiori, lateribus magis rotundatis, ante basin evidentius strangulato, cæterum similiter punctato; elytris dentibus apicalibus, præsertim intermedio, acutioribus. ♂ pectore medio tantum punctulato-piloso, abdomine toto lævi, glabro; femoribus anterioribus coxisque posticis subtus basin versus punctato-pilosis; elytris subluteo-auratis, cupreo viridique micantibus; antennis ferrugineis, articulis duobus basalibus piceis: specimine subimmaturo.

Long. 4½ lin.

Villa Nova. One specimen.

27. *Agra gaudiola*, n. sp.

A. parva, nigro-ænea, elytris læte purpureo-cupreis; capite ovato, pone oculos minus elongato, latiusculo, collum versus subito strangulato; thorace postice angustato, antice prope apicem attenuato, supra regulariter punctulato; elytris brevibus, apice obtuse subtridentatis, recte truncatis; antennis ferrugineis, articulis tribus basalibus obscuratis.

Long. 3 lin. ♀.

Ega. One example.

β. Thorace plagiatim punctato.

28. *Agra excavata*, Klug.

A. excavata, Klug, Entom. Monogr. p. 20, pl. i. fig. 6.

A. nigro-ænea; capite breviter ovato, pone oculos paulo elongato, rotundato-attenuato, vertice foveola media orbiculari;

thorace brevi, antice subito attenuato, dorso plagiatim confluenter grosse punctato; elytris punctato-striatis, apice sinuato-truncatis, bidentatis; antennis robustis, rufescentibus.

Long. 5 lin. ♀.

Beaten in some numbers from bushes, on one occasion at Santarem.

29. *Agra variolosa*, Klug.

Agra variolosa, Klug, Entom. Monogr. p. 18, pl. i. fig. 5.

A. nigro-ænea; corpore toto piloso; capite (ut in *A. excavata*) breviter ovato, vertice foveola et linea longitudinali impresso; thorace longiori, multo angustiori, antice sensim attenuato, supra grosse confluenter punctato; elytris truncatis, bidentatis, supra punctato-striatis, striis alternis foveolatis; antennis robustis, ferrugineis.

Long. 5 lin. ♀.

Taken once only, at Tunantins on the Upper Amazons. Klug's specimens came from Bahia.

30. *Agra biseriata*, Chaudoir.

Agra biseriata, Chaud. Ann. Soc. Ent. Fr. 1861, p. 129.

A. variolosæ similis, at minor, æneo-fusca, pilosa; capite angustiori, pone oculos minus quadrato, postice punctato-piloso; thorace antice sensim attenuato, lateribus pilosis; elytris subsinuato-truncatis, bidentatis, supra punctato-striatis, striis secunda tertiaque sex-foveolatis, pilosis; antennis gracilibus pedibusque testaceo-rufescentibus.

♂ Metasterno medio dense breviter piloso, abdomine glabro.

Long. $4\frac{1}{4}$ lin.

Ega. One of the commonest species on the leaves of low trees.

31. *Agra foveigera*, Chaudoir.

Agra foveigera, Chaud. Ann. Soc. Ent. Fr. 1861, p. 130.

A. biseriatæ similis, major, vix pubescens, nigra, vix metallica; capite breviter ovato, postice haud punctato, vertice foveola magna; thorace gracili, antice sensim attenuato, lateribus haud pilosis; elytris sinuato-truncatis, dentibus duobus elongatis; supra punctato-striatis, striis 2nda, 4ta, 6ta foveolatis, interstitiis planis; mesosterni episternis punctatis; antennis pedibusque gracilibus, nigris.

♂ Metasterno medio dense hirsuto; tibiis posticis arcuatis, intus late sulcatis.

Long. $5\frac{1}{2}$—6 lin.

Ega. Much less common than *A. biseriata*.

32. *Agra immersa*, Klug.

Agra immersa, Klug, Entom. Monogr. p. 21, pl. i. fig. 7.

A. biseriatæ simillima, differt elytris cupreis.

Long. 4 lin.

Pará. Collected by Sieber. I think it very likely this is only a geographical variety of the same stock as *A. biseriata*. I do not find the species among my own Pará collections.

33. *Agra chalcoptera*, Klug.

Agra chalcoptera, Klug, Entom. Monogr. p. 23, pl. i. fig. 8.

„ *elegans*, Chaud. Ann. Soc. Ent. Fr. 1861, p. 130.

A. biseriatæ similis, gracilis, nigro-ænea, pilosa, elytris viridi-æneis vel viridi-cupreis; antennis valde elongatis, rufescentibus, basi piceis; capite ovato, pone oculos rotundato-attenuato; thorace a medio usque ad apicem attenuato, lateribus canopilosis; elytris truncatis, angulis suturalibus haud productis; femoribus piceis, tibiis tarsisque rufescentibus.

♂ Metasterno et abdominis basi medio punctato-pilosis; tibiis posticis simplicibus.

Long. $4\frac{1}{4}$—6 lin.

Equally common with *A. biseriata* at Ega; also found at Pará, where Klug's specimens were taken many years ago by Sieber.

34. *Agra graminea*, n. sp.

This species has a general resemblance in form to *A. chalcoptera*, Klug, but differs in its much more slender figure, the bright brassy-green colour of its thorax and elytra, and in other points. Baron Chaudoir has given me the following comparative description of it:—

"Color fere ut in *A. chalcoptera*, Klug, (*elegans*, Chaud.), sed supra potius viridis, non cupreus; antennæ pedesque similiter colorati. Quoad formam, *A. tenui*, Chaud., (Rev. & Mag. Zool. 1863, p. 9) affinis; caput pone oculos magis attenuatum, thorax pone medium paulo magis inerassatus, intra carinam externam elevatam et juxta lineam medianam evidentius irregulariter punctatus. Elytra paulo latiora, minus parallela, postice magis ampliata, apice omnino rectè truncata, angulo externo minus acuto, striis multo grossius punctatis, interstitiis convexiusculis. Subter lævis, nitida. *A. chalcoptera* differt capite multo angustiori, basi haud foveolato, linea tenui tantum notato; thorace magis filiforme, omnino aliter punctato; elytris angustioribus, interstitiis alternis haud seriato-

foveolatis, apiceque obsolete dentatis ; corpore subtus virescente, paginæ superioris colore gramineo."

Long. 5 lin.

I found one example only of this pretty species, at Ega, on the Upper Amazons.

35. *Agra exarata*, Klug.

Agra exarata, Klug, Entom. Monogr. p. 38, pl. ii. fig. 9.

A. nigra, elytris æneis, subcyaneis ; capite ovato, pone oculos modice elongato, rotundato-attenuato (♂), lævi, lineola impressa occipitali ; thorace robusto, medio ampliato, antice apicem versus attenuato, rugoso-punctato, haud piloso ; elytris postice ampliatis, tridentatis, supra punctato-striatis, striis ramulis interstitiorum interruptis ; antennis pedibusque piceo-nigris.

♂ Metasterno segmentisque ventralibus medio et femoribus basi subtus dense rufo-pilosis, subcrispatis.

Long. 8 lin.

One example, taken at Tunantins on the Upper Amazons. Klug's specimen, taken at Pará, was a female.

36. *Agra cytherea*, Thomson. (Pl. XX. fig. 3, ♂.)

Agra cytherea, Thomson, Archiv. Entom. i. p. 134.

A. nigro ænea, thorace æneo, elytris splendide viridi-metallicis, cupreo micantibus ; capite maris pone oculos subconico, feminæ rotundato-attenuato ; thorace glabro, rugoso-punctato ; elytris elongatis, postice ampliatis, bisinuato-truncatis, subtridentatis, dente externo solum producto, punctato-striatis, interstitiis planis ; antennis rufo-piceis, basi æneo-piceis, pedibus æneo-piceis.

♂ Metasterno segmentisque ventralibus medio densissime pilosis ; femoribus anticis interdum basi pilosis.

Long. $7\frac{1}{2}$—$8\frac{1}{2}$ lin.

Ega. A common species, on trees in the forest.

37. *Agra punctato-striata*, Chaudoir.

Agra punctato-striata, Chaud. Ann. Soc. Ent. Fr. 1861, p. 134.

A. cytherææ simillima, paulo minor ; capite maris pone oculos rotundato-attenuato ut in femina, haud conico ; thorace supra magis punctato ; colore piceo, thorace supra æneo ; elytris viridi-auratis, cupreo micantibus.

♂ Metasterno segmentisque ventralibus medio minus dense pilosis.

Long. 7 lin.

This species, which I cannot think is more than a local form of the same stock as *A. cytherea*, occurred at Pará and on the Lower Amazons, *A. cytherea* being confined to the neighbourhood of Ega on the Upper Amazons. Baron Chaudoir, on whose authority I have referred my specimens to his species, records a wide range for it, he having two specimens, one from the Rio Negro (Amazons) and the other from South Brazil.

38. *Agra varians*, Chaudoir.

Agra varians, Chaud. Ann. Soc. Ent. Fr. 1861, p. 133.

A. cytherææ formâ similis, differt in colore, certe species distinctissima; nigra, elytris obscure viridibus, interdum æneis et rubro-cupreis; capite pone oculos paulo latiori, feminæ subquadrato, maris rotundato-attenuato; elytris apice tridentato, dente intermedio validiori, suturali obtuso, supra magis fortiter punctato-striatis.

Long. 7—8 lin.

Still more common than *A. cytherea* at Ega. I convinced myself on the spot that the two species kept themselves perfectly distinct, and no intermediate forms were found which could prove that they ever intercrossed.

39. *Agra optima*, n. sp.

M. de Chaudoir has given me the following description of this species:—

"*A. splendidæ*, Dej., valde affinis, forsan hujus speciei femina. Differt capite postice latiori, pone oculos magis rotundato, thorace crassiori, lateribus etiam magis rotundato; elytris paulo brevioribus, apice tridentatis sed dente suturali haud producto, obtuso, nec reflexo; antennis brevioribus, articulo 8vo breviusculo: elytris colore rubro-cupreis, splendidis."

Long. 9½ lin. ♀.

Villa Nova.

M. de Chaudoir adds, after comparing my specimen with Dejean's type in his own collection, that the affinity with *A. splendida* (Dej.) is very great, and that, excepting the sexual differences, he finds no distinctive character except in the conformation of the tip of the elytra, which usually offers no difference in the

two sexes; this case, however, might offer an exception. Dejean's example of *A. splendida* came from Latreille, and is supposed to have been received from Peru.

40. *Agra cuprea*, Klug.

Agra cuprea, Klug, Entom. Monogr. p. 41, pl. iii. fig. 2.

A. varianti colore simillima, obscure ænea, vel viridis vel ænco-cuprea; differt corpore multo robustiori, elytris apice valde acute tridentatis; capite ovato, pone oculos rotundato-attenuato (♂), subquadrato, vertice leviter impresso; thorace robusto, medio subdilatato, supra interstitiis lævibus, latiusculis; elytris punctato-striatis, striis alternis serie punctorum majorum, apice acute tridentatis; antennis piceo-rufis, articulis basalibus pedibusque nigris.

♂ Elytris angulo suturali modice producto; metasterno, femoribus anticis posticisque intus, et segmento ventrali ultimo dense rufo-pilosis.

♀ Elytris angulo suturali in dente longissimo producto, antennis articulo 8vo breviusculo.

Long. 8½ lin.

Ega and St. Paulo; Upper Amazons.

41. *Agra laticeps*, n. sp.

A. robusta, nigro-ænea, elytris obscure viridi-æneis; capite late ovato, pone oculos paulo elongato, citò rotundato-attenuato, vertice haud impresso; thorace medio valde dilatato, antice subiter sinuato-attenuato, supra plano, lineatim subirregulariter punctato, haud rugoso, carina laterali prominula, episterno sparsim punctato; elytris latiusculis, apice truncatis, angulo suturali parum producto, supra obscure æneo-viridibus, punctato-striatis, striis 2^nda^, 4ta, 6ta serie punctorum impressis; antennis nigris, articulis singulis basi rufis; pedibus nigris.

♂ Segmentis ventralibus postice (basali etiam antice) sparsim punctato-pilosis.

Long. 9 lin.

Ega. Rare.

42. *Agra phæogona*, n. sp.

Baron Chaudoir has supplied the following description of this remarkable species:—

"*A. Feisthamelii* (Buquet) valde affinis; differt magnitudine mi-

nore, capite pone oculos minus elongato, magis trigono, cum palpis nigro, antennis gracilioribus, articulis duobus baseos paulo obscurioribus; thorace paulo breviori, multo minus et subtilius et ad lineam mediam vix punctato, episternis lævibus; elytrorum striis in fundo subtiliter rugosis, genubusque nigris."

Long. 7 lin. ♀

The antennæ (with the exception of the two basal joints) and the legs (except the black knees) are clear reddish-yellow; the sutural and external angles of the elytra are produced into long teeth.

Villa Nova. One example.

Klug has also described the following species, which seem to me to differ from all the foregoing and which I did not myself meet with. Their place in this genus is uncertain.

43. *Agra multiplicata*, Klug.

Agra multiplicata, Klug, Entom. Monogr. p. 39, pl. iii. fig. 1.

A. nigro-ænea; occipite subimpresso; thorace subelongato; elytris punctato-striatis, apice tridentatis, purpurascentibus, supra transversim plicatis; capite attenuato-elongato; antennis rufo-piceis.

Long. 6¾ lin. ♀?

Pará.

44. *Agra clavipes*, Klug.

Agra clavipes, Klug, Jahrbücher, p. 58.

A. picea; capite postice vix attenuato, obsolete impresso; thorace cicatricoso, conico; elytris subæneis, punctato-striatis, apice tridentatis.

Long. 8 lin. ♂

Pará.

Klug compares it with *A. femorata*; but it evidently belongs to a quite different group and may be a slightly immature example of his *A. cuprea*. Klug was not aware of the sexual differences in the thickness of the femora.

XVII. *New Species of* Agra *in the Collection of* Mr. W. W. Saunders. By H. W. Bates, F.Z.S.

[Read 1st May, 1865.]

Whilst engaged in studying this difficult genus in the preparation of the foregoing paper on the Amazonian species, I have been entrusted with the examination of the Collection of *Agræ* belonging to Mr. W. W. Saunders, and finding therein four well-marked new species, have obtained permission to describe them by way of supplement.

Agra Valentina. (Pl. XX. fig. 7, ♀.)

A. robusta, nigra; capite ovato, pone oculos usque ad collum sensim rotundato-attenuato; antennis nigris, articulis (♀) 8—11 abbreviatis, 8vo brevissimo, ovato; thorace capite haud longiori, medio lato, antice subito attenuato, episternis convexis, dorso plano, postice vage punctato; elytris oblique truncatis, apice suturali dehiscenti, angulo externo acuto, dorso striato-punctato, punctis latera versus majoribus, remotioribus, striis 2-3 foveolis variis; pedibus nigris, tibiis compressis, tarsis articulo ultimo lato.

Long 9 lin. ♀

Closely allied to *A. latipes*, Chaudoir (Ann. Soc. Ent. Fr. 1861, p. 112), but more robust, and the elytra quite free from metallic lustre. The head is similar in shape, i. e. somewhat regularly oval and impunctate, but it is a little shorter; the thorax differs in being much broader in the middle, and the breadth is still further increased by the convexity of the episterna; the surface is more even and the punctures more scattered and less deeply impressed. The elytra are of the same shape as in *A. latipes*, being sinuated before the middle and then again dilated before the apex, but the rows of punctures differ greatly in having each a number of much larger punctures, and in the lateral rows having all the punctures larger and more distant. The legs and tibiæ are similar in form, but the basal joint of each tarsus is rather broader and has a mere rounded outline (♀) than the same sex of *A. latipes*; the claw joint is broad.

One example, from Columbia (Venezuela).

Agra dominula. (Pl. XX. fig. 5, ♀.)

A. nigro-picea, nitida; antennis pedibusque piceo-rufis, geniculis obscurioribus; capite oblongo-ovato, pone oculos oblongo, imprimis sensim, deinde collum versus citius attenuato; thorace capite vix longiori, medio vix dilatato, apicem versus leniter attenuato, episternis convexis, impunctatis, dorso transversim strigoso, irregulariter punctato, punctis haud profundis; elytris apice oblique flexuoso-truncatis, angulis externis breviter productis, acutis; dorso profunde punctato-striatis, punctis raro confluentibus, interstitiis angustis, lævibus; pedibus validis, tibiis apices versus compresso-dilatatis, tarsis articulo primo dilatato, unguiculari lato.

Long. 11 lin. ♀

Allied to *A. erythropus* (Dejean), but much larger and proportionally more elongated and the elytra far more deeply and strongly punctate-striate. The lateral lobes of the mentum are elongate and subacute, and the species therefore belongs to the same small section as *A. erythropus* and *A. latipes*. The four terminal joints of the antennæ are shorter and more slender than the preceding, the eighth being very short and oval, almost globular in shape. There is no trace of metallic glimmer on the body, but the whole surface is of a fine lustrous dark pitchy-black, the antennæ dark reddish and the legs rather lighter and clearer pitchy-red, with the knees dusky. The tibiæ are compressed, but are not perceptibly dilated until towards the apex, and the basal joint of each tarsus (♀) is much broader than the others, with its sides rounded.

This grand species, of which a single example is in Mr. Saunders' Collection, is from Peru.

Agra Saundersii. (Pl. XX. fig. 4, ♂.)

A. magna, nigra, nitida, femoribus (apicibus exceptis) flavis; capite elongato-quadrato; thorace angusto, antice attenuato, constricto, dorso grosse lineatim punctato, episternis vix convexis, parce punctatis; elytris postice ampliatis, oblique truncatis, angulo suturali valde producto, externo mucronato, dorso profunde lineatim foveolatis, foveolis discretis, fundo metallicis, interstitiis reticulatis.

Long. 12 lin. ♂

Closely allied to *A. geniculata* (Klug) and having a great resemblance to it in shape and colour, but it is nearly twice the length and bulky in proportion. The head is very much prolonged behind the eyes and but very slightly narrowed (in straight lines) to

the neck, at which point it is strongly constricted on all sides. The elytra are proportionally more dilated near the apex than in *A. geniculata*, and the sutural angle is much more produced, resembling in this respect *A. rufescens*; their surface is marked with impressed rows of distinct regular foveæ, the bottoms of which have a slight brassy lustre, and the interstices both longitudinal and transversal are narrow, so that the surface appears almost reticulated. The legs are robust and shining black, except the middle part of the femora, which is yellow; the middle and hind tarsi are elongated, the basal joints being also elongated and slender. The antennæ are shining black (apical joints wanting).

Male.—Middle of metasternum and a space in the middle of the hind part of the three basal ventral segments punctured and pubescent. Anterior tarsi with the basal joint rotundate-dilatate; middle tibiæ with a strong tooth within (and hirsute) near the apex; posterior tibiæ strongly bent inwardly in the middle and thickened and hirsute thence to the apex.

This large and handsome species is from Peru; there is a single specimen only in Mr. Saunders' Collection.

Agra occipitalis. (Pl. XX. fig. 1, ♂.)

A. nigra, thorace elytrisque æneis, his certo situ subcupreo-micantibus; capite elliptico, ante oculos modice protenso, pone oculos valde elongato, vix attenuato; thorace angusto, grosse lineatim punctato; elytris flexuoso-truncatis, angulis suturalibus nullomodo, externis breviter, productis, supra lineatim foveolatis (haud striato-impressis), foveolis interdum elongatis, fundo multipunctatis; antennis pedibusque nigro-piceis.

♂ tibiis posticis leniter incurvatis, a medio usque ad apicem intus dense hirsutis.

Long. 6 lin. ♂

Allied to *A. mœrens*, Chaud. (Ann. Soc. Ent. Fr. 1861, p. 119) and *A. scrutatrix* (*ante*, p. 370); the head is broader and less narrowed behind the eyes than in the ♂ of *A. mœrens*, and the insect differs from both species in its brighter brassy colour, with faint coppery reflexions towards the apex of the elytra. The head is of an elliptical shape, and the part behind the eyes is much longer than the anterior part. The foveæ on the elytra have no trace of lying in impressed lines as is the case with the species above quoted, and some of the foveæ are elongated, with a few obscure bluish punctures at their bottoms.

One example, from Brazil.

EXPLANATION OF PLATE XX.

Fig. 1. *Agra occipitalis*, Bates. ♂.
2. ,, *tibialis*, Chaudoir. ♀.
3. ,, *cytherea*, Thomson. ♂.
4. ,, *Saundersii*, Bates. ♂.
5. ,, *dominula*, Bates. ♀.
6. ,, *anguinea*, Bates. ♂.
7. ,, *Valentina*, Bates. ♀.

XVIII. *Descriptions of some New Species of Hymenopterous Insects belonging to the Families* Thynnidæ, Masaridæ *and* Apidæ.

By Frederick Smith, V.P. Ent. Soc.

[Read 1st May, 1861.]

The insects described in the present paper, with one or two exceptions, are the property of F. Du Boulay, Esq., who has placed them in my hands for examination. Amongst these are some of the finest species of the various genera to which they belong, particularly, I may point out, those of the rare genus *Paragia*, three new species of which add greatly to the interest of this small collection of Australian Hymenoptera. But the most remarkable insect described is a bee, belonging to the section of leaf-cutting bees; this I have characterised as forming a new genus (*Thaumatosoma*), principally from the circumstance of its possessing elongated capitate antennæ; I know but of one other instance in which a bee has true capitate antennæ; this is in a species of *Tetralonia* from Brazil.*

Fam. THYNNIDÆ.

Genus Thynnus.

Thynnus ventralis.

T. luteus; antennis abdominisque segmentis apicalibus nigris; alis fuscis.

Female.—Length 10 lines.

Pale luteous, the antennæ and tips of the mandibles black; a transverse black line on the vertex, from which two angular stains emanate, each enclosing one of the posterior ocelli; the pit, in which the anterior ocellus is situated, is also black; all the sutures of the thorax black; the wings dark brown; the basal joint of the tarsi more or less obscurely ferruginous, the rest of

* A description of this species is given, *post*, p. 398. There are three genera of "long-horned bees," in which the males have their antennæ frequently as long as, or in some cases even longer than, the body. The first genus established, *Eucera*, is at once known from the others by the species having only two submarginal cells in the anterior wings; the other genera, *Tetralonia* and *Melissodes*, have each three submarginal cells, but *Tetralonia* has 6-jointed maxillary palpi and 4-jointed labial palpi, whereas *Melissodes* has both maxillary and labial palpi 4-jointed.

the joints black; abdomen with the fourth and following segments black; the fourth with two transverse ovate yellow maculæ, the fifth with two minute spots; beneath black.

Hab. Swan River.

Genus Ælurus.

Ælurus agilis.

Æ. niger; capite thoraceque ferrugineo-variegatis; abdomine ferrugineo, segmento primo nigro; alis hyalinis, nervuris nigris.

Male.—Length 6 lines.

Black; the clypeus, the scape in front, and the mandibles, ferruginous; the cheeks with a long cinereous beard; the head closely and coarsely punctured. The thorax beneath, the legs, a large macula beneath the wings, and the pro- and meso-thorax ferruginous, the latter with an oblong black patch extending from its base to the apex; the scutellum ferruginous; the post-scutellum yellow; the sides of the metathorax clothed with long cinereous pubescence; the wings hyaline, the nervures black; the legs more or less black or fuscous above; abdomen ferruginous, with the basal segment black; the thorax is coarsely punctured, the abdomen with distant shallow punctures, except the basal segment, which is closely and finely punctured.

Hab. Swan River.

Genus Rhagigaster.

Rhagigaster simillimus.

R. niger; maculâ sub alis abdominisque segmentis duobus apicalibus ferrugineis; tibiis tarsisque testaceis.

Male.—Length 8 lines.

Black; head and thorax rugose and covered with short cinereous pubescence; a large oblong ferruginous macula beneath the wings, which are hyaline, their nervures black; the tibiæ and tarsi rufo-testaceous, with the claw joint fuscous; abdomen black and shining, the two apical segments ferruginous, the tip of the ultimate one black.

Hab. Swan River.

Rhagigaster flavifrons.

R. niger; capite antice flavo; thorace ferrugineo.

Female.—Length 8 lines.

Black; the head distantly and finely punctured; the anterior portion of the head as high as the vertex of the eyes, and the

mandibles yellow; the head subquadrate, slightly narrowed behind; thorax ferruginous, finely and closely punctured, with a number of larger scattered punctures; the articulations of the legs and the tarsi rufo-testaceous; abdomen elongate and shining, the second segment transversely striated, the apex ferruginous and longitudinally striated.

Hab. Swan River.

Fam. MASARIDÆ.

Genus Paragia, Shuck.

This genus was established in the year 1837, at which time only a single example was known; since that period nine additional species have been described. I here add three new and beautiful species to the list, making the total number thirteen. In the generic characters given by Shuckard and drawn from the type *Paragia decipiens*, the trophi are not characterized, but Saussure has figured them in his Monograph of the Family *Masaridæ*, in which this genus is placed—the maxillary palpi being six-jointed, the labial four-jointed. That this is not a social genus of wasps, I think is proved by an examination of the tarsal claws, which are bifid, a character nowhere found hitherto amongst the social *Vespidæ*, but characteristic of all the solitary species. The type specimen described by Shuckard is now in the British Museum, and proves to be in a discoloured, bad condition; I therefore add, in the list of the species of the genus, a more correct description, drawn from specimens obtained from Adelaide in the finest state of preservation. All the known species are from Australia and Tasmania.

1. *Paragia decipiens*, Shuck. Trans. Ent. Soc. ii. 82, pl. viii. fig. 3, ♀.
Sauss. Mon. Masar. p. 54.

P. nigra, opaca; abdomine sulphureo.

Female.—Length 9 lines.

Black, opaque; head and thorax shagreened, with two confluent yellow spots between the antennæ; a narrow interrupted line on the anterior margin of the prothorax and a minute spot beneath the wings sulphur-yellow; wings dark fuscous, palest at their posterior margins; abdomen sulphur-yellow, the base of the first segment black, from which a narrow black line emanates and runs down the upper surface of the segment to its posterior margin.

Male.—This sex has the clypeus, an abbreviated line on the inner margin of the eyes, two minute spots between the antennæ,

and the scape in front, yellow; the anterior tibiæ are yellow in front; the second segment of the abdomen is produced beneath into a large pointed tubercle.

Hab. Adelaide.

2. *Paragia tricolor*, Smith, Trans. Ent. Soc. ser. 2, i. 41, pl. v. fig. 1, ♂.
„ *Smithii*, Sauss. Mon. Masar. p. 55, 3, t. 2, fig. 1, ♀.
Hab. Adelaide.

3. *Paragia Saussurii*, Smith, Cat. Vesp. p. 2, 3, ♀.
„ *tricolor*, Sauss. Mon. Masar. p. 54, 2, ♀ (nec Smith).
Hab. Perth, W. Australia.

4. *Paragia odyneroides*, Smith, Trans. Ent. Soc. ser. 2, i. 42, pl. v. fig. 2.
Sauss. Mon. Masar. p. 56, 4.
Hab. Hunter River, Australia.

5. *Paragia australis*, Sauss. Mon. Masar. p. 57, 5, ♂, ♀.
Hab. Tasmania.

6. *Paragia bicolor*, Sauss. Mon. Masar. p. 58, 6, .
Hab. Australia.

7. *Paragia bidens*, Sauss. Mon. Masar. p. 59, 7, ♂, ♀.
Hab. Adelaide.

8. *Paragia predator*, Sauss. Mon. Masar. p. 59, 8, ♀.
Hab. Australia.

9. *Paragia pictifrons*, Smith, Cat. Vesp. p. 2, 9, ♀.
Hab. Swan River.

10. *Paragia deceptor*, Smith, Trans. Ent. Soc. ser. 3, i. 56, ♀.
Hab. Adelaide.

11. *Paragia calida*.

P. nigra; capite thoraceque profunde punctatis, flavoque variegatis; abdomine aurantiaco; segmentis primo et tertio nigris; alis fuscis.

Male.—Length 6 lines.

Black; the head and thorax thickly covered with deep confluent punctures; the clypeus, an oblong-shaped macula widest at the apex above it, and a line on the inner orbit of the eyes not reaching their summit, yellow; the prothorax bordered with orange along its anterior margin; the tibiæ and tarsi ferruginous, the anterior tibiæ with a fuscous stain behind, and the intermediate and posterior pairs with a similar stain outside; the wings fuscous,

the anterior pair very dark along the anterior margin; abdomen bright orange-red, the first and third segments black, the latter with its posterior margin narrowly bordered with orange, the margin waved anteriorly; the basal segment with a central longitudinal line, not deeply impressed, and the line is orange towards the posterior margin of the segment; the second segment narrowly black at its basal margin, most broadly so in the centre.

Var.—The orange border to the prothorax recurved at the lateral angles, and enclosing a triangular black shape on the face of the truncation; the compressed tooth on the lateral margins of the metathorax orange-red; the basal segment of the abdomen with only two united bilobed black spots.

Hab. Adelaide.

12. *Paragia venusta.*

P. nigra, aurantiaca multipicta; abdominis basi et segmento tertio aurantiacis; alis hyalinis, anticis margine anteriori fusco.

Female.—Length 5 lines.

Black, opaque; the clypeus, a coronet-shaped spot above and a line at the inner and outer orbits of the eyes, not reaching to their summit, the prothorax, an epaulet over the tegulæ, the scutellum, a minute spot on the mesothorax before the scutellum, a spot on each side of the metathorax, another beneath the wings, and the legs, all orange-yellow; the coxæ black; the wings hyaline, with the anterior margin of the superior pair dark fuscous; the basal segment of the abdomen, an interrupted narrow band at the basal margin of the second, the third segment, the apical margin of the two following, and the sixth segment entirely, orange-yellow; beneath, the third segment entirely, and the apical margin of the first and second segments, orange.

Hab. Swan River.

13. *Paragia vespiformis.*

P. nigra; capite thoraceque flavo-variegatis; abdomine fasciis quinque flavis; alis subhyalinis.

Female.—Length 7 lines.

Black and opaque; the clypeus, base of the mandibles exteriorly, a broad stripe along the inner margin of the eyes extending upwards from the base of the mandibles to the insertion of the antennæ, a shorter narrow stripe above the broad one, and also a short thin line above each antenna, yellow; behind the eyes there is also a yellow stripe; a narrow line on the anterior

margin of the thorax, a minute spot in the middle of the mesothorax, the inner margin of the tegulæ, the posterior margin of the scutellum, and a large ovate spot on each side of the metathorax, yellow; a subtriangular spot beneath the wings, and the legs beneath, yellow; a yellow spot on the intermediate and posterior coxæ, all the trochanters, the base of the anterior and intermediate coxæ, as well as the anterior tibiæ, black; the wings subhyaline, the nervures black; a broad yellow fascia, slightly interrupted in the middle, on the margin of the basal segment of the abdomen; the three following segments have each a narrower interrupted fascia; on the apical margin of the fifth segment an entire fascia, emarginate in the middle; beneath yellow, the second segment having a transverse black spot at its basal margin, and the three following having each a narrow central black stripe at the basal margin; the sixth segment black, with the tip more or less yellow.

Hab. Swan River.

Fam. APIDÆ, Leach.

Genus Thaumatosoma, n. g.

Labial palpi four-jointed, the two basal joints elongate, their length about equal, the third and fourth joints minute and subclavate, inserted at the apex of the second joint; the labial palpi and the labium of equal length. The maxillary palpi two-jointed, minute; the basal joint short, stout and cylindric, the second about the same length as the first, but much more slender and pointed at the apex. The basal lobe of the maxillæ shorter than the apical one, which is elongate, lanceolate and curved. Head as wide as the thorax; eyes large, lateral and elongate-ovate; the ocelli three in a triangle on the vertex, the posterior pair placed in a line with the posterior margin of the eyes; the labrum elongate, produced and rounded anteriorly; the antennæ capitate (in the male), elongate, reaching to the middle of the abdomen, the club compound, formed of the two apical joints compressed and pyriform. The anterior wings have one marginal and two submarginal cells, the latter receiving both the recurrent nervures, the first near the basal, the second near the apical angle of the cell. The legs simple. Abdomen oblong, the sides parallel, rounded at the base and apex.

It will be seen that the above characters, with the exception of the capitate antennæ, are those of the genus *Megachile*; but the exceptional character is so remarkable when possessed by a member of the great family *Apidæ*, that I have thought it desirable to depart from the rigid observance of those laws which usually

regulate the formation of genera. The insect, for the reception of which I have established the present genus, is perhaps strictly a species of *Megachile*, since in that genus we find an infinite variety in the form of some organs in the male sex of different species; we have one species found in this country, *Megachile Willughbiella*, of which Mr. Kirby observes, "This sex (male) of our insect exhibits a peculiarity which none of those that are related to it in the form of the anterior tarsus possess; the last joint of its antennæ is larger than any of the rest, which gives them some resemblance to those of a *Papilio*." The antennæ thus described are, however, exactly like those of the majority of the males of *Megachile*, with the exception of the apical joint, which is compressed, and, when viewed laterally, presents the club-shaped form alluded to. In the insect here described the antennæ are extremely slender and elongate, as in the genus *Eucera*, with the two apical joints forming a knob, or club, as in the beautiful Lepidopterous genus *Argynnis*.

Thaumatosoma Duboulaii. (Pl. XXI. fig. 1.)

Male.—Length 5 lines.

Black, the head and thorax opake, very finely and closely punctured; the face with a thin clothing of long silvery pubescence, that on the clypeus is more dense, shorter, and has a yellowish tinge; the antennæ ferruginous, with the apical knob or club black. The sides of the thorax with a thin cinereous pubescence; the wings subhyaline, their nervures black; the tegulæ rufo-testaceous behind. Abdomen shining and closely punctured; the posterior margins of the segments with a narrow fringe of white pubescence; the fourth segment clothed with fulvous; the fifth and sixth finely rugose, the latter slightly but widely emarginate; the seventh segment concealed beneath the sixth, its margin armed on each side with a short acute tooth, and also having two longer blunt marginal spines which are equidistant from each other and from the lateral spines; the basal segment produced beneath into a blunt projecting node.

The specimen described is in bad condition; judging from the ragged state of the wings, and the rubbed thorax and abdomen, it must have been long disclosed at the time of capture; the white abdominal bands are nearly obliterated. I have named it, as a mark of compliment and encouragement to its captor, F. Du Boulay, Esq.

Hab. West Australia.

Supplementary Paper.

[Read 7th August, 1865.]

In addition to the figure and details of *Thaumatosoma Duboulaii*, I have added to the Plate some remarkable forms of antennæ of other species of Aculeate Hymenoptera, and herewith append short descriptions of the insects themselves.

There are two or three known species of bees, the males of which have the apical joint of the antennæ compressed, so that when viewed sideways, as Mr. Kirby remarks, "it gives them somewhat the appearance of those of a *Papilio*;" such is the the antenna of *Nomia Kirbii*, as will be seen by the figure, but this, when viewed from above, appears to be of the ordinary form; in the case of *Thaumatosoma* it is quite different, and the imitation of the antenna of a *Papilio* is complete; all the joints of the flagellum are attenuated and thread-like, except the two apical, which are enlarged, and swollen into a knob.

Fam. MUTILLIDÆ.

Genus Psammotherma, Latr.

Psammotherma flabellata. (Pl. XXI. fig. 6.)

Male.—Length 5 lines.

Black; strongly punctured; the prothorax and tegulæ ferruginous; the antennæ bipectinate; the wings brown; the posterior margin of the first and second segments of the abdomen narrowly edged with white pubescence, the third segment clothed with similar pubescence.

The female has the pro- and meso-thorax entirely red.

This species of *Mutilla* is from Senegal.

Fam. POMPILIDÆ, Leach.

Genus Ctenocerus, Dahlb.

Ctenocerus ramosus. (Pl. XXI. fig. 4.)

Male.—Length $\frac{3}{4}$ of an inch.

Black, the mandibles and labrum ferruginous; the antennæ ferruginous, with the scape black and furnished beneath with a long dense floccus of black hair; the wings yellow and subhyaline; the apex of the wings with a dark brown border; the neuration pale ferruginous; the anterior tibiæ and tarsi obscurely ferruginous; the head very convex in front; the thorax

elongate, longer than the abdomen, and also wider; the metathorax oblong and covered with a dense black pubescence; the abdomen covered with a sericeous reflexion.

The female closely resembles the male, and is similarly coloured; the antennæ are simple, dusky above, ferruginous beneath, two or three of the apical joints being entirely so; the abdomen is very smooth and shining and as long as the head and thorax.

Length $\frac{9}{10}$ of an inch.

This species was taken by Dr. Kannemeyer, at Burgerdorp, a Dutch settlement in South Africa.

The only character that separates this insect from many species of *Pompilidæ* is the pectination of the antennæ of the male; it is however, perhaps, desirable to retain Dahlbom's genus for the reception of such species as have similar antennæ; the type is the *Ctenocerus Klugii*, Dahlb., subsequently described by Lucas under the name *Clavelia pompiliformis*, Ann. Ent. Soc. Fr. 1852.

Fam. ANDRENIDÆ, Leach.

Genus Lamprocolletes, Smith.

Lamprocolletes cladocerus, Smith. (Pl. XXI. fig. 3.)

See Trans. Ent. Soc. ser. 3, i. 57.

Black; the face and cheeks clothed with hoary pubescence, the mandibles ferruginous at their apex; the joints of the antennæ bipectinate, the pectinations irregularly toothed; thorax shining, finely punctured, thinly clothed with hoary pubescence; the wings hyaline and iridescent; the claw-joint of the tarsi ferruginous, the calcaria pale testaceous; abdomen shining, margins of the segments depressed; finely punctured, and with a thinly scattered hoary pubescence.

Male.—Length $4\frac{1}{4}$ lines.

Taken near Sydney, Australia.

This remarkable bee is still unique in the British Museum. The beautiful ramose antennæ of the male present perhaps the most remarkable example of those organs known in the entire tribe of the *Aculeata*; such an extraordinary departure from the normal form of antenna could scarcely have been looked for in the *Apidæ*, and if met with at all, might with much greater probability have been expected to occur amongst the *Tenthredinidæ*.

Genus Nomia, Latr.

Nomia Kirbii, Westw. MS. (Pl. XXI. fig. 5.)

Male.—Length 7 lines.

Black; the head narrower than the thorax; the face and posterior margin of the vertex with a thick sooty-black pubescence; the antennæ a little shorter than the thorax, the apical joint compressed; the thorax clothed with short sooty pubescence; the wings dark brown; the anterior tibiæ and tarsi fringed behind with sooty pubescence; the intermediate femora incrassate and compressed beneath into a semidentate process; the posterior tibiæ also much swollen, forming a subtriangular mass which has a tooth at its inferior angle; abdomen ovate and shining, being thinly covered with sooty pubescence.

This species is from Brazil; it formed part of the Collection of the Rev. W. Kirby, and is now in the British Museum.

Fam. APIDÆ.

Genus Tetralonia, Spin.

Tetralonia mirabilis. (Pl. XXI. fig. 2.)

Male.—Length ½ an inch.

Head and thorax black; the clypeus, labrum and mandibles yellow, the base of the former black and the apex of the latter ferruginous; the face, cheeks and hinder margin of the vertex thickly clothed with long pale fulvous hair; the antennæ elongate, extending to the middle of the abdomen; the scape, first and base of the second joint of the flagellum black, the third to the eighth joints, which are cylindric and of about equal length, ferruginous and of the usual form, the three following attenuated to the thinness of a hair, the apical joint being black, flattened and pear-shaped; the thorax clothed above with fulvous pubescence, much paler beneath; the tegulæ, base of the nervures of the wings and the legs ferruginous; the wings subhyaline, the nervures fusco-ferruginous, the costal nervure blackish; abdomen reddish-brown, the basal margins of the segments with broad fasciæ of fine short pale downy pubescence.

The species is from Rio.

Notwithstanding the remarkable form of the antennæ of this insect, I leave it for the present in the genus *Tetralonia*; should other species occur with similar antennal peculiarities, they may be conveniently separated from *Tetralonia*, and constitute a new genus.

Genus Chalicodoma.

Chalicodoma cœlocera, Smith. (Pl. XXI. fig. 7.)

This species was described in the Catalogue of *Apidæ*, published by the Trustees of the British Museum; it was there included in the genus *Megachile;* subsequently Herr Gueinzius forwarded from Port Natal both sexes of the insect and the nest, which proved it to belong to the genus *Chalicodoma*, which constructs mud nests on walls, &c. The sexes are similarly coloured, black and pubescent, with the abdomen bright fulvous-red, except the basal segment, which is black; the wings are dark brown; in the male sex, the antennæ are clavate and hollowed out beneath, and the anterior tarsi are expanded as in the males of *Megachile*.

Length $\frac{2}{3}$ of an inch.

EXPLANATION OF PLATE XXI.

(All the figures are considerably magnified.)

Fig. 1. *Thaumatosoma Duboulaii*, ♂; 1*a*, antenna.
2. *Tetralonia mirabilis*, ♂, antenna.
3. *Lamprocolletes cladocerus*, ♂; 3*a*, antenna; 3*b*, underside of antenna.
4. *Ctenocerus ramosus*, ♂, antenna; 4*a*, underside of ditto.
5. *Nomia Kirbii*, ♂, antenna.
6. *Psammotherma flabellata*, antenna; 6*a*, underside of a few joints of ditto.
7. *Chalicodoma cœlocera*, ♂, antenna; 7*a*, underside of ditto.

XIX. *Descriptions of New* Phytophaga *from Western Australia. By the* Rev. Hamlet Clark, M.A., F.L.S.

[Read 1st May and 5th June, 1865.]

In laying before the Society a paper containing descriptions of certain new species of *Phytophaga* from Western Australia, I desire to offer a few remarks on Entomological papers generally —their object, their legitimate scope, and their value.

I will begin with what is a self-evident proposition; that papers, like those which are honoured by a place in our Transactions, may be of the greatest importance to the cause of science; *or* they may be to its very serious injury—and this latter even when the writers have a real aptitude for and are thoroughly conscientious in their self-imposed studies.

Papers are really valuable when—and indeed only to the degree to which—the information which they supply (its accuracy, its completeness) is sufficient to outweigh the labour that will be required on the part of future students in order to obtain access to them, and to master their contents; for it is well to remember that the author of the most perfect paper in the world is not only by writing it undertaking work himself, but he is most certainly making future work for others; the more he can save the time of others the more useful is his work—the more his paper taxes the time of others the less profitable is his work: this simple fact, if we admit it, at once suggests one aspect which gives in part the measurement of the value of any paper, as an addition to Entomological literature: its limit and scope should be clear and well defined, and within that limit it should be, as far as its subject will permit, exhaustive: it may comprehend a genus, or a group of genera; or it may comprehend a country or a continent: but it should comprehend something, and be limited to something, and within that range it should aim at being as perfect as time and material will allow. I will grant that there is a great charm in being able to wander at will over a vast domain; to describe from one continent a beautiful species; from another continent to seek to fix a striking form as a new genus; to travel from one group to another—from the old world right across to the new—and all within the limits of a few pages! But what infinite labour is all

this causing to future students! or rather, I would say, how great is the risk that some future student, either by accident or indolence, may ignore part of the contents of such a paper altogether. The husbandman who marks out a small portion of unreclaimed land, and then brings the whole of that portion under cultivation, is doing far better work than he who fearlessly charges at the whole sweep of country up to the very horizon; the labour of the former will bear fruit long after the very name of the latter has been forgotten.

And it is worthy of notice, that that which most permanently benefits science is that which also contributes most renown to the writer himself. He who has thoroughly mastered one single point will certainly stand out among us more clearly than he who has ranged over a hundred points and mastered none; to do little, and make that little available for others, is far better than to do much and to add infinitely to the labours of others. It is not the happy possessor of a collection—crowded though it may be in types, or most ample in material—whose name will be most esteemed by our successors; for collections pass away from hand to hand, and leave behind them hardly the name of him to whom they have been the care of years: it is not necessarily even the irrepressible writer, who has added a hundred papers to our literature; it is indeed certain that such a man has been industrious, but it does not by any means follow that that industry has been wisely applied. He rather will be spoken of as excellent, who—it may be with small opportunities—it may be with less brilliant talent than that of many others—has in his studies kept always before him a sense of the vastness of the range of Natural Science; a desire to benefit others, rather than to amuse himself; and hence a resolution to touch nothing that he cannot complete.

I offer these remarks as a preface to a very unpretending paper, with no sort of intention of criticizing any papers published by the Society, except my own; but because I desire that our literary efforts, which will hereafter give the character to ourselves, may not suffer when compared with those of others; and because I am conscious myself of an absolute proneness to the failing to which I refer—a tendency to discursiveness in Entomological work.

The following descriptions of insects represent part of a very interesting little collection of West Australian Phytophaga, which has been placed in my hands by Mr. Du Boulay. Mr. Du Boulay's

method of entomologizing has been this: he rides some score miles every day through the bush; he provides himself with a strong canvas bag, which generally in his gallops is dragging behind him—very much I imagine after the manner of a dredging-net at a yacht's stern in a ten-knots' breeze. At opportune moments during the day this bag is examined; its apex is found crammed with insect life; three or four of the largest and most striking specimens are selected; the rest are tossed away, and the gallop resumed. I have reason to know that for the future our friend, who is really as keen an Entomologist and as true a lover of nature as any one I know, will take better care of the residuum of the contents of his sweeping-net. He excused himself to me for his natural-selection tendencies by stating that he believed that he was the only one in Australia or Europe who was sufficiently advanced to care for such things. Mr. Du Boulay, on his return to West Australia, will be envied by many of us as having it within his power to explore an almost unknown and most interesting Entomological Fauna.

List of new Species hereinafter described.

CHRYSOMELIDÆ. *Paropsis*, seventeen species; see tabular analysis below.
Chalcolampra undulatipennis.
laticollis.
Australica æneonitens.
Chalcomela subpunctata.

EUMOLPIDÆ. *Geloptera Duboulaii.*
nodosa.
Thaumastomerus viridis.
Edusa aureoviridis.
setosa.
hispidula.
nigro-ænea.
Ocnus viridis.

Fam. CHRYSOMELIDÆ.

Genus PAROPSIS, Oliv.

The species of *Paropsis* described in this paper may be tabulated as follows:—

[I.] Corpore ovato, depresso.
(1) *P. mediovittata.*
(2) *P. apicata.*

[II.] Corpore brevi, subrotundato, satis gibboso.
[A.] Elytris lævibus.
1. Elytris striato-punctatis.
(a) Elytris rufo-fulvis, vel testaceis.
(3) *P. amœna.*
(4) *P. captiosa.*
(5) *P. maculicollis.*
(b) Elytris maculatis.
(6) *P. purpureo-aurea.*
(7) *P. tessellata.*
(8) *P. nigroconspersa.*
(9) *P. sanguineotincta.*
(10) *P. transversomaculata.*
(11) *P. intertincta.*
(c) Elytris nigris.
(12) *P. nigritula.*
2. Elytris confuse punctatis.
(13) *P. nigropicta.*
[B.] Elytris rugosis, vel subtuberculatis.
(a) Elytris concoloribus (punctis ipsis forsitan tinctis).
(14) *P. incurva.*
(15) *P. perparvula.*
(b) Elytris maculatis, vel aliter tinctis.
(16) *P. nervosa.*
(17) *P. verrucipennis.*

1. *Paropsis mediovittata.*

Elongato-ovalis, depressa, striato-punctata, rufo-flava, suturâ latè fulvo-rufâ : *caput* crebrè punctatum, vel rufo-flavum vel testaceum ; *thorax* transversus, basi subsinuatâ, lateribus rotundatis, versus apicem contractis, marginatis, angulis anticis haud prominentibus ; crebrè sed minutè punctatus, ad latera puncta profundiora ; *scutellum* subelongatum, lateribus subrotundatis, impunctatum, nitidum ; *elytra* apice attenuata, depressa, punctato-striata, punctis minutis æqualibus ordinatis, interstitia subtiliter punctata ; rufo-flava, vitta media rufo-fulva apud suturam utrinque strias duas amplectens, apex ipse quoque rufo-fulvus ; *corpus subtus*, *pedes* et *antennæ* flavo-testacei.

Long. corp. lin. 4—2¾ ; lat. lin. 2½—2.

P. mediovittata belongs to that sub-section of this large genus, which includes those species that have elongated and flattened

bodies; it is closely allied in form to *P. scaphoides*, Baly (ined.), which also I have received from Western Australia.

In Mr. Baly's Collection as well as in my own.

2. Paropsis apicata.

E minutis, depressa, ovalis, punctato-striata, flava, in exemplo desiccato ad scutellum et apicem sanguineo-notata: *caput* crebrè punctatum, rufo-flavum, labro ad medium fusco-notato; *thorax* vix triplo longitudinem latitudine superans, margine antico angulato-emarginato, postico sinuato, transverso, angulis anticis breviter rotundatis; confertim et inæqualiter punctatus, punctis versus latera majoribus; flavus, vel rufo-flavus, margine antico tenuiter rufo-fusco, et dorso medio obscure rufo; *scutellum* triangulare, impunctatum, rufo-flavum; *elytra* lata, depressa, apice rotundata, striato-punctata, punctis crebris minutis, interstitiis minute punctatis et versus apicem elevatis; margines utrinque minutè et confusè punctati; quoad colorem (in exemplo unico desiccato) flava, apice late et regione scutellari sanguineis, color autem flavus incertus et adumbratus est, interdum fusco ambigue notatus; *corpus subtus* flavum, abdomine fuscato; *pedes* flavi, genubus et tarsis rufo-flavis: *antennæ* rufo-fuscæ, apice subincrassatæ.

Long. corp. lin. 2; lat. lin. $1\frac{1}{5}$.

A single example from which the above description is taken suggests, by its appearance, that the living insect may be quite different in colour, and probably of singular beauty; it will be recognised from all species of a similar size by the well-pronounced coloration of the apex and its somewhat less distinct triangular post-scutellary marking.

3. Paropsis amœna.

Lata, circularis, depressa, striato-punctata, pallide flava, sanguineo-colorata: *caput* antice sinuato-transversè foveolatum, crebrè punctatum, flavum, labro rufo-flavo, medio fusco-tincto; *thorax* penitus longitudinem latitudine triplo superans, angulis anticis prominulis et obtusis, posticis rotundatis, latera rotundata et tenuè marginata, margine anteriori valdè excavato et marginato; valde punctatus, crebrius ad latera, utrinque ad latera latè impressus, rufo-flavus, flavo-notatus, notis tribus longitudinalibus, apud apicem medium

connexis, mediâ rectâ, lateralibus valde sinuatis; margines etiam obscure flavi; *scutellum* elongato-triangulare, læve, impunctatum, rufo-flavum, medio flavo; *elytra* ampliata, satis depressa, apice rotundata, striato-punctata, punctis crebris minutis et ordinatis, interstitia subtilissime punctata et rugosa, margines ampliati et confuse et fortiter punctati; flavo-sanguineo omnino tincta, marginibus exceptis flavis; *corpus subtus* et *pedes* pallide flavi; *antennæ* fuscæ, articulis 1—4 flavis.

Long. corp. lin. $3\frac{1}{2}$; lat. lin. 3.

It is possible that the sanguineous coloration of the elytra may be in some examples absent. The species may be distinguished by its almost circular and depressed form, and the regular even and minute punctuation of its elytra.

Champion Bay.

4. *Paropsis captiosa.*

Lata, subcircularis, post medium paulum ampliata, vix depressa, humeris utrinque subtuberculatis, striato-punctata, pallide flava: *caput* ad labrum transversè et subcircullariter foveolatum, crebrè punctatum, pallide testaceum, labro ad medium nigro-tincto, et maculâ utrinque nigrâ minutâ apud basin; *thorax* longitudinem mediam latitudine plus duplo superans, angulis anticis obtusis distinctis, lateribus marginatis et rotundatis, angulis posticis rotundatis; indistincte sed ad latera crebrius et fortius punctatus; *scutellum* elongato-triangulare, impunctatum, læve; *elytra* lata, post medium ampliata, apice breviter rotundata; juxta humeros utrinque oblique visos tuberculum breve apparet; striato-punctata, punctis ordinatis confertis et minutis, interstitia vix lævia sed minutissime punctata vel rugosa, (striæ ad latera et ad apicem paulum profundæ videntur, haud ut in *P. amœnâ* obsoletæ et læves), margines ampliati et fortiter punctati; *corpus subtus* et *pedes* flavi; *antennæ* fuscæ, articulis basalibus rufo-testaceis.

Long. corp. lin. $3\frac{1}{2}$; lat. lin. 3.

P. captiosa is nearly allied to *P. amœna* (*ante*, p. 405), both in general form, size and punctate striation of the elytra; after a careful examination I am persuaded that it represents a separate and a new species: when viewed laterally it is decidedly less depressed, more globose; when viewed obliquely, a tubercular elevation near the shoulders stands out distinctly, and makes the

shoulders more prominent than in *P. amœna*. The outline also, from above, is somewhat different; in *P. amœna* it is broadly subcircular, in *P. captiosa* it is somewhat dilated behind the middle.

Champion Bay.

5. *Paropsis maculicollis.*

Rotundato-ovalis, punctato-striata, flava vel flavo-testacea: *caput* foveâ lineari ad apicem transversâ subsinuatâ, crebrè punctatum, flavum, basi et maculis duabus juxta basin (aliquando confluentibus et basi connexis), etiamque interdum lineâ apicali, nigris; *thorax* latitudine duplo longitudinem superans, angulis posticis rotundatis, anticis haud prominulis, margine apicali valde emarginato et sinuato; punctatus (punctis crebris minutis et inæqualibus, latera versus magnis et confertis), flavus, maculis quibusdam in formâ literæ W ordinatis (interdum conjunctis, interdum insulatis, et in numero circa decem); *scutellum* subtriangulare, minutissime punctatum, nigro-fuscum; *elytra* brevia, lata, striato-punctata, flava vel fusco-flava, punctis minutis raris nigris ordinatis sed intervallis inæqualibus dispositis, interstitia etiam evidenter punctata; *corpus subtus* rufo-testaceum; *pedes* testacei, genubus fuscis; *antennæ* flavæ, apicibus fusco-adumbratis.

Long. corp. lin. $2\frac{1}{2}$; lat. lin. 2.

A well-defined little species, notable by its thoracic maculations, and the minute black and sparingly-distributed punctures of its elytra.

6. *Paropsis purpureo-aurea.*

Rotundato-ovalis, satis depressa, punctato-striata; dum viva, purpureo-aurea, mortua et desiccata, flavo-testacea, fusco-maculata: *caput* lineâ anticè sinuato-transversâ, punctatum, flavum; *thorax* transversus, latitudine haud elytra sed longitudinem ipsius plus duplo superans, lateribus rotundatis, angulis posticis rotundatis, anticis haud prominulis, crebre punctatus, punctis in disco minutis inæqualibus, ad latera confertis et majoribus; quoad colorem flavus, disco medio confusè fusco-ornato; *scutellum* subcordiforme, impunctatum; *elytra* satis lata, marginibus ampliatis, striato-punctata, punctis minutis confertis et æqualiter ordinatis, interstitia etiam punctis crebris ornata; quoad colorem obscurè notata, flavo-testacea, utrinque circulo magno scutellari, alteroque

apicali subelongato maximo, maculâ etiam laterali antemediâ elongatâ; *corpus subtus* flavum; *pedes* et *antennæ* pallide flavi.

Long. corp. lin. $3\frac{1}{2}$; lat. lin. $2\frac{3}{4}$.

Mr. Du Boulay says that the example from which this description is taken was, when alive, inconceivably brilliant and lovely; it was one single gem of bright metallic purple and burnished gold, and so attractive that he carried it for some days in his handkerchief in the bush; at last it died, he looked for it but could not find it, and only saw, to his utter bewilderment, in its place an obscure-looking flavous insect, as it presents itself to me. According to his description (which accords exactly with the present markings), the elytra are golden, with a broad well-formed ring of brilliant purple (extending over half the breadth of the elytra) on either side near the scutellum, and another oblong ring which occupies the whole apical part of the elytra; between the two rings, near the side, is a third longitudinal purple marking; the margins of the elytra are broadly and palely golden; the thorax is golden, with a magnificent centre-piece of purple.

I have had much pleasure in receiving a kind offer from Mr. Du Boulay, that on his return to his Australian home he will prepare *coloured drawings* of species of this genus when in a living state, and forward them to me, together with the specimens from which the drawings were made. In this way, and it appears to me in this way only, can we make our descriptions of this genus of value to Australian Entomologists.

Champion Bay.

7. *Paropsis tessellata.*

Ovata, satis rotundata, vix depressa, punctato-striata; exempli mortui et desiccati corpus subtus, pedes, et antennæ rufo-flavi, elytra pallide testacea, fusco-maculata: *caput* antice lineâ obsoletâ juxta epistoma curvatâ, leviter punctatum, rufo-flavum; *thorax* longitudine latitudinem vix triplo superans, lateribus rotundatis et satis ampliatis, margine antico lato valdè emarginato, angulis anticis subprominulis, sparsim punctulatus, rufo-flavus, maculis utrinque in medium (vel maculâ transversâ adumbratâ indeterminatâ) fuscis; *scutellum* triangulare, læve (rarissime punctatum), flavo-fuscum; *elytra* brevia, longitudine amplitudinem superantia, punctato-striata, punctis æqualibus sed inæqualiter distributis, pallidè fusca, maculis 20—30 quadratis in singulo elytro pallidè

testaceis; *corpus subtus* pallidè flavum; *pedes* flavi, genubus et femoribus supra fusco-adumbratis; *antennæ* rufo-flavæ.

Long. corp. lin. $3\frac{1}{3}$; lat. lin. $2\frac{1}{2}$.

P. tessellata is conspicuous among other species by the peculiar tessellated pattern of its elytra; frequently the closely arranged order of punctures is interrupted, in each interruption appears a rectangular flavous marking, in the centre of which is a single puncture; the ordinary punctures are black on a fuscous ground, the isolated punctures are fulvous on a flavous ground.

I have received two examples of this species from Mr. Du Boulay, one of which is in Mr. Baly's cabinet, the other in my own.

8. *Paropsis nigroconspersa.*

Late ovata, subrotundata, vix depressa, rufo-testacea, nigro-maculata et conspersa: *caput* sparsim punctatum; *thorax* transversus, margine posteriori subrotundato in medio ampliato, lateribus paulum rotundatis et caput versus compressis, angulis anticis obtusis, posticis modice rotundatis; sparsim punctatus, lateribus punctis crebrius ornatis; *scutellum* triangulare, impunctatum, nitidum; *elytra* satis brevia et rotundata, striato-punctata, punctis profundis modicis ordinatis, versus latera media autem confusis, plerumque nigris; maculæ etiam nigræ post-mediæ longitudinales suturales elytra ornant; macula inter strias 1 et 2 post scutellum, elongata; inter strias 3 et 4 major, interstitium totum ad medium elytri occupans; inter strias 4 et 5 series macularum minorum, et inde ad latera minores inordinatæ plus minus distributæ; apicem versus majores et plus confertæ, ad humeros quoque (ad strias 7 et 8) macula major insulata; *corpus subtus, pedes* et *antennæ* rufo-flavi.

Long. corp. lin. $3—2\frac{3}{4}$; lat. lin. 2.

Two specimens are before me, which differ but slightly the one from the other. The species may be recognized among its punctate-striate congeners by the double lines of elongate markings near the suture, and the lateral more irregular and insular markings.

I received both specimens, ♂ and ♀, from Mr. Du Boulay, from Champion Bay.

9. *Paropsis sanguineotincta.*

E minoribus, ovalis, subparallela, ad apicem attenuata, striato-punctata, rufo-testacea, nigro-vittata, medio sanguineo-tincta:

caput supra labrum transversè arcuatè foveolatum, crebrè punctatum, ad basin nigro-marginatum ; *thorax* transversus, lateribus rotundatis juxta angulos anticos vix rotundatos subcompressis, angulis posticis obtusis ; crebrè et minutè punctatus, punctis ad latera fortioribus ; *scutellum* subcordiforme, impunctatum, rufo-testaceum ; *elytra* satis parallela, thorace paulum latiora, apicem versus attenuatiora, utrinque striis 10 punctorum ornata, punctis confertis et ordinatis, interstitia minutissimè punctata ; in elytro singulo sutura et vittæ quatuor interruptæ nigræ ; prima scutellaris, brevis, inter strias 2 et 3 ; secunda inter strias 4 et 5, apicem attingens, sed in medium interrupta ; tertia brevis, juxta apicem apud striam 7 ; quarta marginalis, sed longo intervallo a margine separata, apud striam 9, et humeros et apicem penitus attingens, sed in medio interrupta ; striæ 2, 3 et 4 juxta apicem sese attingunt ; in medio elytrorum utrinque macula magna roseo- vel sanguineo-tincta ; *pedes*, *corpus subtus* et *antennæ* rufo-flavi.

Long. corp. lin. $2\frac{1}{3}$; lat. lin. $1\frac{1}{2}$.

A lovely little species, marked with four interrupted but bold vittæ of black, and having in the middle of each elytron an indeterminate marking of bright rufous.

Champion Bay.

10. *Paropsis transversomaculata.*

E minoribus, depressa, late ovalis, marginata, striato-punctata, flava, maculis nigris ornata : *caput* inæqualiter punctatum, flavum, labro rufo-tincto, basi maculis duabus magnis nigro-rufis ornatâ ; *thorax* latitudine plus duplo longitudinem excellens, angulis posticis et anticis obtusis, emarginatione anteriori profundâ, haud circulari sed utrinque obtusè angulatâ ; crebrè confusè et inæqualiter punctatus, punctis ad latera confertis et majoribus, flavus, maculâ utrinque insulatâ magnâ dilutâ rufo-fuscâ, marginibusque tenuiter rufo-coloratis ; *scutellum* elongato-triangulare, impunctatum, rufo-fuscum ; *elytra* lata, ovata, post medium latiora, apice rotundata, depressa, late marginata, striato-punctata, punctis æqualibus ordinatis nigris, interstitiis etiam subtiliter punctatis ; margo latus, planus, punctis sparsis confusis ad latera ornatus ; elytra flava, macularum serie lunatâ transversâ medianâ, alterâque apicali ; mediana e maculis tribus penitus confluentibus vix striam lateralem attingentibus constat, series postica ad striam 9 extendit ; macula utrin-

que exterior major et latior, et apud humeros quoque macula insulata nigra; *corpus subtus* nigrum; *pedes* et *antennæ* rufo-flavi.

Long. corp. lin. $2\frac{1}{4}$; lat. lin. $1\frac{2}{3}$.

This species may be recognized by its depressed and broadly ovate form, the markings on its head and thorax, and the two subcircular transverse rows of fuscous markings on the elytra.

A single example in my collection is from Champion Bay.

11. *Paropsis intertincta.*

Late ovalis, subdepressa, punctato-striata, rufo-flava, maculis nigris ornata: *caput* minutè punctatum, labro ad medium nigro-notato, basi nigrum; *thorax* transversus, latitudine longitudinis duplum æquante, angulis anticis rotundatis, posticis obtusis; crebrè et minutè punctatus, punctis apud latera majoribus et confertis; *scutellum* triangulare, impunctatum, fuscum; *elytra* rotundata, subdepressa, post medium latiora, punctato-striata, punctis minutis confertis, interstitiis minutè punctatis; rufo-flava, maculis nigris ornata, serie subcirculari circa scutellum, alterâque post medium circa apicem (interdum penitus obliteratâ), maculâ etiam longitudinali laterali ante medium: *antennæ*, *corpus subtus*, et *pedes* rufo-flavi.

Long. corp. lin. $2\frac{1}{4}$; lat. lin. $1\frac{3}{4}$.

P. intertincta is allied to *P. transversomaculata*, but abundantly distinct; the punctures of the elytra are much more minute, and the maculation of the elytra is entirely different. In the species before us the medial subtransverse row of maculations is inflected towards the apex; in *P. transversomaculata* it is inflected towards the base.

Champion Bay.

12. *Paropsis nigritula.*

E minimis, depressa, late ovalis, striato-punctata, rufo-flava, elytris nigris: *caput* sparsim punctatum, flavum, labro ad medium fuscato; *thorax* transversus, latitudine longitudinem plus duplo superante, lateribus subrotundatis et marginatis, angulis anticis obtusis, posticis subrotundatis; minutè punctatus, fortius ad latera, flavus, margine antico fuscato; *scutellum* subtriangulare, læve, nigrum; *elytra* lata, depressa, striato-punctata, interstitiis subtilissime punctatis; *antennæ*

flavo-testaceæ; *pedes* testacei; *corpus subtus* nigrum, abdomine fuscato.

Long. corp. lin. $1\frac{1}{5}$; lat. lin. 1.

Notable by its minute size, its depressed form, and its black punctate-striate elytra.

13. *Paropsis nigropicta.*

Rotundato-ovalis, subtiliter punctata, rufo-sanguinea, nigro-maculata: *caput* punctatum, rufum, labro et basi (oculos ad latera amplectenti) nigris; *thorax* transversus, valde declivis, basi superne visâ transversâ, lateribus subrotundatis, angulis vix acutis, margine anteriori valde sinuato-emarginato; punctatus, punctis inæqualibus minutis crebris, rufo-sanguineus, maculâ utrinque nigrâ circulari insulatâ magnâ ornatus; *scutellum* magnum, triangulare, læve, nigrum; *elytra* rotundata, brevia, pone medium sub-ampliata, punctata, punctis confertis inæqualibus vix ordine dispositis, rufo-sanguinea nigro-maculata, maculis quatuor, 1ª ante-laterali subtriangulari vel subcirculari plerumque insulata, 2da scutellari circulari magnâ margines basalem et suturalem attingenti et maculam rufam intra sese amplectenti, 3ª post-mediâ transversâ inæquali interdum in maculis duabus divisa, 4ta apicali ad suturam etiamque ad marginem hemielytrorum extendenti; *antennæ* rufæ; *corpus subtus* nigrum, abdomine rufo-marginato; *pedes* rufi, femoribus nigro-ornatis.

Long. corp. lin. $2\frac{1}{5}$; lat. lin. $1\frac{3}{4}$.

The four examples before me vary but little from each other either in size or degree of coloration; the insect is quite distinct from other known species of the group.

14. *Paropsis incurva.*

Late ovalis, globosa, elytris transversè visis subgibbosis, fusco-rufa: *caput* antice utrinque transversè foveolatum, crebrè et leviter punctatum; *thorax* longitudinem latitudine triplo superans, angulis anticis breviter rotundatis, posticis late rotundatis, punctatus, punctis sat minutis et crebris, apud latera fortioribus; *scutellum* triangulare, levissime punctatum; *elytra* lata, globosa, marginibus paulum ampliatis, striato-punctata, punctis brevibus inæqualibus, inæqualiter subordinatis, interdum etiam confusis interdum obsoletis, ad margines paulum majoribus et rarius distributis,

elytra quoque leviter et crebrè verrucosa et transversim rugosa, rugis omni parte dispartitis; *corpus subtus* rufo-ferrugineum, metasterno medio fusco-adumbrato; *pedes* et *antennæ* rufo-flavi.

Long. corp. lin. $3\frac{1}{2}$; lat. lin. 3.

This species may be recognized from other species with verrucose elytra, by the gibbous form of the medial elytra when seen sideways, and by the comparatively undeveloped and generally distributed rugosities on the surface of the elytra.

Champion Bay.

15. *Paropsis perparvula.*

Late ovalis, subcircularis, convexa, subtuberculata, confusè punctata, rubiginosa: *caput* crebrè punctatum, spatio basali brevi lævi; *thorax* transversus, latitudine longitudinem triplo superans, crebrè et satis fortiter punctatus, angulis anticis distinctis, posticis rotundatis, lateribus etiam rotundatis; *scutellum* late triangulare, læve, rufo-flavum, marginibus rufo-fuscis; *elytra* satis convexa, rotundata, confusè et crebrè punctata, punctis versus suturam et apicem seriebus ordinatis; tubercula etiam rarius apparent, inæqualia plerumque insulata juxta suturam apicalem penitus ordinata; *corpus subtus* et *antennæ* flavo-fuscæ; *pedes* flavo-rufi.

Long. corp. lin. $2\frac{1}{3}$; lat. lin. 2.

P. perparvula, though belonging to the very difficult and extensive sub-group of tuberculated species, is, I believe, easily to be recognized—at all events it abundantly differs from all Western Australian species with which I am acquainted. I have several species in my Collection, received for the most part from M. Damel, from the North and North-West districts: the species before us may be recognized easily among them all by its small size, the close irregular punctuation of the elytra, which becomes near the apical suture arranged in striæ, and by the absence of any dark fuscous spots on the elytra.

Champion Bay.

16. *Paropsis nervosa.*

Late ovalis, vix gibbosa, vibicibus transversis apud elytra ornata, punctata, rufo-castanea: *caput* apud labrum foveâ lineari subtransversâ ornatum, inæqualiter rugosum, plagâ circulari utrinque mediâ subdepressâ nigrâ, labro etiam ad

medium nigro; *thorax* longitudinem latitudine triplo superans, angulis anticis rotundato-obtusis et prominulis, posticis rotundatis, lateribus rotundatis et tenuiter marginatis, margine anteriore latè emarginato; ad medium carina obsoleta longitudinalis; punctatus et vermiculariter subrugosus, maculâ utrinque magnâ nigrâ penitus quadratâ inter medium et marginem, et in his maculis rugis fortioribus et distinctis; *scutellum* triangulare, punctatum; *elytra* satis gibbosa, post medium paulum ampliata, marginibus extensis, apice vix rotundato sed paululum producto; fortiter et crebrè punctata, punctis nigro-fuscis, apud humeros utrinque tuberculo unico paulum elevata, ad latera et ad medium vibicibus interruptis 2 vel 3 ornata, etiamque tuberculis vix crebris apud apicem sed juxta suturam post-mediam crebrioribus et seriebus 2 ordinatis; quoad colorem rufo-castanea, maculâ fuscâ magnâ indeterminatâ ad scutellum, alterâ in tuberculum humerale, iterumque vittâ subobsoletâ rufo-fuscâ a humeris ad apicem continuatâ; *corporis subtus* prothorax flavus, metathorax rufo-flavus nigro-tinctus, abdomen crebrè punctatum, rufum; *antennæ* rufo-flavæ; *pedes* flavo-testacei.

Long. corp. lin. $2\frac{3}{4}$; lat. lin. $2\frac{1}{5}$.

P. nervosa may be distinguished by its strongly punctate elytra, which are marked by a single medial transverse raised band, and one or two others, smaller and more interrupted, nearer the apex; the almost quadrate (not circular) markings of the thorax, and the rufo-flavous markings on the elytra, amply distinguish it from allied species.

17. *Paropsis verrucipennis.*

Late ovalis, gibbosa, verrucis et quasi vibicibus transversis ornata, rufo-castanea, nigro-maculata: *caput* crebrè punctatum, rufo-castaneum, labro ad medium nigro-notato; *thorax* triplo longitudinem latitudine superans, angulis posticis rotundatis, anticis obtusis, lateribus rotundatis; crebrè punctatus, punctis confusis inæqualibus ad latera magnis; rufo-castaneus, utrinque ad latus maculâ circulari magnâ; *scutellum* subcordiforme, ad medium subdepressum, minute punctatum; *elytra* gibbosa, infra scutellum rotundato-elevata, marginibus post medium paulum ampliatis, apice rotundato; verrucis inæqualibus post medium seriebus ordinatis tecta,

ad latera notis transversis elevatis inæqualibus 1 vel 2 vel 3 ornata; *pedes* rufo-flavi; *corpus subtus* et *antennæ* rufo-fuscæ.
Long. corp. lin. 3; lat. lin. $2\frac{1}{2}$.

The group of species of this genus that has the elytra of a rufo-ferruginous colour and adorned with tubercular elevations, either in the form of isolated warts or transverse weals, is very numerous, and the species in some instances are both closely allied and subject to variation of sculpture. The species before us however presents no difficulty of definition; it is in form very gibbous; behind the scutellum the whole of the elytra, when viewed laterally, is raised into a hump-like elevation; their surface is covered with warty elevations, arranged near the apex in irregular striæ, and near the sides interrupted by and changed into transverse elevated ridges, more or less clearly defined; the broad circular lateral markings of the thorax also render this species conspicuous among its congeners.

Genus Chalcolampra, Blanch.

1. *Chalcolampra undulatipennis.*

Oblongo-ovalis, subparallela, æneo-metallescens, elytris punctis etiamque tuberculis obsoletis ornatis: *caput* inter oculos transversè subdepressum, ad margines oculorum crebrè et fortiter punctatum, juxta labrum utrinque oblique et breviter foveolatum (foveæ margine impunctato), versus basin leviter et sparsim punctatum; *thorax* magnus, transversus, latitudine elytra æquans, declivis, lateribus leviter rotundatis, margine anteriori fortiter emarginato, basali transverso recto; utrinque leviter apud margines depressus, et sparsim sed fortiter punctatus, apud discum rarissime punctis magnis sed crebrè minutissimis ornatus; *scutellum* transverso-triangulare, impunctatum, lævе, nitidum; *elytra* parallela, versus apicem subattenuata, etiamque declivia, punctis raris satis magnis ordinatis, etiam quasi tuberculis subelevatis ornata, ordinibus quinque dispositis; *corpus subtus* rufo-æneum, abdomen autem nigrum, segmento apicali in medio fortiter impresso; *pedes* nigro-æneo metallici, genubus tarsisque rufo-metallescentibus; *antennæ* rufo-fuscæ.
Long. corp. lin. 4; lat. lin. $2\frac{1}{3}$.

Very nearly allied to *Chalcolampra verrucosa*, Clark (Journ. Entom. ii. 250), but broader, of a more decided green metallic

colour, and with the elevations on the elytra much less distinctly expressed.

I have received a single specimen of this species from Swan River.

2. Chalcolampra laticollis.

Oblongo-ovata, subparallela, æneo-nigra, striato-punctata: *caput* leviter et sparsim punctatum, punctis ad apicem et juxta oculos crebrius instructis, labro rufo-ferrugineo; *thorax* latitudine longitudinem duplo superans et elytra æquans, lateribus ampliatis et rotundatis, sparsim punctatus, punctis apud latera majoribus et crebris; *scutellum* triangulare, impunctatum; *elytra* parallela, apice declivia, striato-punctata, punctis minutis confertis et plerumque ordinatis, striis ipsis versus medium obsoletis; *corpus subtus* rufo-fuscum; *pedes* rufo-flavi; *antennæ* pallide rufæ.

Long. corp. lin. 4; lat. lin. 2.

This species resembles *Australica irrorata*, Baly; the thorax has its sides more rounded in front; the head and thorax are much more punctate; and the stripe-like punctures of the elytra are more evenly arranged and less crowded.

Champion Bay.

Genus Australica, Chevr.

1. Australica æneonitens.

Elongato-ovalis, satis parallela, crebrè punctata, thorace fusco-æneo vel viridi-æneo, elytris viridi-æneis: *caput* fortiter et crebrè punctatum, fusco-nigrum, labro rufo-flavo; *thorax* transversus, lateribus ampliato-rotundatis, punctatus, punctis satis crebris juxta latera confertis; *scutellum* subtriangulare, impunctatum, læve; *elytra* parallela, punctata, punctis crebris et satis magnis juxta suturam seriebus 2 vel 3 inordinatis dispositis, alibi confusis; *corpus subtus* æneo-nigrum; *pedes* rufi, genubus fuscis; *antennæ* rufæ.

Long. corp. lin. $2\frac{1}{4}$; lat. lin. 1.

This pretty little species is quite distinct from its congeners, and may at once be recognized by its bright blue colour: it will by reason of its parallel form be placed near to *A. Waterhousii*, Baly, (Trans. Ent. Soc. 3rd ser. i. 620.)

Champion Bay.

In Mr. Baly's collection, and also in my own.

Genus Chalcomela, Baly.

1. *Chalcomela subpunctata.*

C. pilulæ (Clark, Journ. Entom. ii. 251) affinis; fere rotundata, æneo-nigra, subtiliter punctata: *caput* foveâ lineari minutâ subtransversâ alteràque longitudinali versus apicem, subtiliter et creberrimè punctatum, labro rufo-flavo; *thorax* ut in *C. pilulâ* sed crebrius subpunctatus; *scutellum* late triangulare, impunctatum, nitidum; *elytra* rotundata, striato-punctata, punctis haud ut in *C. pilulâ* magnis et inæqualibus sed minutis confertis et ordinatis, interstitia subtiliter punctata etiamque subtilissimè rugosa; *corpus subtus*, *pedes* et *antennæ* nigro-ænei.

Long. corp. lin. $2\frac{4}{5}$; lat. lin. $2\frac{1}{5}$.

This species may readily be separated from *C. pilula* by its more regular stripe-like punctures on the elytra; the punctures are smaller and more closely arranged: it differs also in the minute thread-like fovea on the head.

Champion Bay.

Fam. EUMOLPIDÆ.

Genus Geloptera, Baly, Journ. Entom. i. 283.

1. *Geloptera Duboulaii.*

Oblonga, convexa, parallela, punctata vel reticulata, plerumque metallico-violacea: *caput* in medio foveolatum, fortiter punctatum, violaceum; *thorax* transversus, lateribus antice constrictis et depressis, marginatis et dentibus obsoletis 3 vel 4 armatis, margine basali subsinuato et in medium marginato; confusè confertim et inæqualiter punctatus; *scutellum* subcirculare, impunctatum, viride; *elytra* versus apicem striis 2 vel 3 utrinque brevibus ornata, interstitiis elevatis, disco transversè et fortiter reticulato; metallico-violacea, marginibus tenuiter viridibus; *corpus subtus* viride, abdomine fusco; *pedes* rufo-metallici; *antennæ* rufæ.

Long. corp. lin. 4; lat. lin. $2\frac{3}{4}$.

This species, which I name in honour of its captor, is entirely different from the other two species of the genus, *G. tuberculata* and *G. geniculata*, both of which, found at Swan River, are common in collections.

In the collection of Mr. Baly, as well as in my own.

2. Geloptera nodosa.

Subelongata, obscurè cuprea, confusè punctata, nodis ornata: *caput* labro nigro, punctatissimum, vel nigro-cupreum vel nigrum; *thorax* vix transversus, angulis anticis compressis, fortiter et rugosè punctatus, nodis 4 in medio instructus; *scutellum* transversè subcirculare; *elytra* satis elongata, apice attenuata, fortiter et confertim punctata, obsolete tuberculata, tuberculis plerumque insulatis; *corpus subtus* nigro-fuscum, abdomine pube adpressâ pallidâ obtecto; *pedes* rufo-fusci; *antennæ* nigro-fuscæ.

Long. corp. lin. 3—2⅓; lat. lin. 1½—1¼.

In appearance this species approaches *G. tuberculata*, but is much smaller and more parallel: it is more elongate than *G. geniculata*.

In the collection of Mr. Baly, and also in my own.

Genus Thaumastomerus.

Genus novum ex *Eumolpidis*, late ovatum. *Caput* verticale, antice subproductum. *Palpi* articulo ultimo turgido, incrassato, haud ut plerumque in genere *Edusâ* subelongato. *Antennæ* filiformes, elongatæ, tenues. *Thorax* transversus, angulis anticis valde depressis et acutis, marginibus lateralibus subrotundatis, anteriori emarginato, posteriori sinuato. *Scutellum* quadratum, apice obtuso. *Elytra* lata, thorace paulum latiora, posticè subattenuata, punctata, nitida. *Abdomen* segmento penultimo tertio latiore. *Femora* antica robusta, margine inferiori ad medium angulato; media valde incrassata, brevia, arcuata (latitudo media penitus tertiam partem longitudinis æquat); postica attenuata, ad medium subglobosa. *Tibiæ* anticæ ad basin leviter incurvatæ, versus apicem latiores, margine juxta apicem obtusè angulato; mediæ breves, robustæ, inflectæ, subcylindricæ; posticæ elongatæ, graciles. *Tarsi* antici et postici articulo basali lato et magno, secundo minuto triangulari, penultimo profunde bilobato, ultimo curvato; medii articulo basali secundum vix superante. *Unguiculi* limbi ambo robusti, hamis ipsis minutis valde incurvatis et brevibus.

The above diagnosis is taken from a single example of a most abnormal form of *Eumolpidæ*. Generally it resembles the species of *Edusa*, but is somewhat broader and less parallel; its striking peculiarity consists in the strange incrassation of its medial fe-

mora. I am told by its captor that the species jumps with strength and quickness.

I have, from the same collection, a single example of what I take to be the female of the same species, resembling the typical form in every particular except the incrassation of the femora.

1. *Thaumastomerus viridis.*

Late ovatus, postice subattenuatus, punctatus, viridi-metallicus, nitidus : *caput* verticale, ad medium subdepressum, punctatum, labro rufo-fusco ; *thorax* crebrè et inæqualiter punctatus ; *scutellum* impunctatum ; *elytra* lata, subdepressa, punctata, punctis apud latera penitus veluti in rugis transversè ordinatis ; *corpus subtus* nigro-viride ; *pedes* rufi ; *antennæ* graciles, rufæ, articulis ultimis fuscatis.

Long. corp. lin. 3 ; lat. lin. 2.

Champion Bay. Taken by Mr. Du Boulay.

Genus Edusa, Chevr.

1. *Edusa aureoviridis.*

Brevis, lata ; elytra striato-punctata et transversè rugosa ; sparsim albo-pubescens, aureo-viridis : *caput* leviter punctatum ; *thorax* transversus, angulis anticis depressis et acutis, fronte mediâ prominenti, angulis posticis breviter rotundatis, margine basali transversè sinuato, lateribus submarginatis, crebrè et leviter punctatus, ad latera rarius pubescens ; *scutellum* latè cordiforme, subtilissimè punctatum ; *elytra* brevia, robusta, apice paulum elongata, striato-punctata, transversè rugosa, rugis minutis confertis versus suturam evidentioribus ; lævia, nitida, versus apicem subtiliter pubescentia ; *corpus subtus* nigrum ; *pedes* et *antennæ* rufi.

Long. corp. lin. $2\frac{1}{2}$; lat. lin. $1\frac{1}{2}$.

2. *Edusa setosa.*

Robusta, punctata, æneo-nigra, pube albidâ obtecta : *caput* apud labrum utrinque breviter et oblique foveolatum, punctatum, basi sparsim pubescente, labro rufo ; *thorax* transversus, margine basali arcuato, minutè punctatus, pube tenui albidâ vel omnino vel sparsim tectus ; *scutellum* quadratum, apice rotundato, leviter punctatum ; *elytra* robusta, punctata, punctis crebris indistinctis et confusis, transversè rugosa, rugis minutis juxta suturam et basin evidentioribus, pube albidâ adpressâ lævi obtecta ; *corpus subtus* nigrum,

testacco-pubescens; *pedes* rufi, *antennæ* rufæ, articulis ad bases fusco-adumbratis.

Long. corp. lin. $2\frac{1}{2}$; lat. lin. $1\frac{1}{2}$.

3. *Edusa hispidula.*

Robusta, subtiliter punctata, nigra, pube crassâ ornata vel obtecta: *caput* pube pallidâ omnino obtectum, labro testaceo; *thorax* transversus, omnino albido-pubescens (pube vix ut in *E. setosâ* tenui sed spissâ crassâ et adpressâ), infra pubem aureo-metallicus vel nigro-aureus, haud niger; *scutellum* quadratum, apice rotundato, leviter punctatum; ut thorax, pubescens; *elytra* robusta, levissime punctata, in exemplo unico pube crassâ ad apicem et præsertim ad basin penitus obtecta, in exemplis integris sine dubio omnino obtecta; *corpus subtus* fuscum, sed pube albidâ tenui frequenti obtectum; *antennæ* et *pedes* rufi.

Long. corp. lin. $2\frac{1}{2}$; lat. lin. $1\frac{1}{2}$.

4. *Edusa nigro-ænea.*

Robusta, transversè rugosa, pallidè pubescens, nigro-ænea; *caput* punctatum, subtiliter pubescens, labro rufo-fusco; *thorax* transversus, angulis anticis valde depressis, margine basali sinuato et leviter marginato, crebrè et inæqualiter punctatus, ad latera sparsim pubescens; *scutellum* quadratum, apice late rotundato, impunctatum; *elytra* lata, paulum thorace latiora, transversim rugosa, rugis minutis inæqualibus juxta suturam evidentioribus; versus latera et apicem sparsim pubescentia; *corpus subtus* impubescens, nigrum; *pedes* rufi; *antennæ* rufæ, articulis apud bases nigro-fuscatis.

Long. corp. lin. 3; lat. lin. $1\frac{2}{3}$.

Genus Ocnus.

Genus novum ex *Eumolpidis*, elongatum, parallelum, satis depressum, metallicum. *Caput* haud verticale, penitus porrectum, labri margine anteriori emarginato, haud ut in genere *Edusâ* subrotundato vel transverso. *Thorax* quadratus, angulis anticis depressis et penitus rotundatis, margine postico sinuato. *Scutellum* quadratum, apice transversè obtuso. *Elytra* parallela, thorace paulum latiora, apice declivia. *Antennæ* filiformes, graciles, versus apicem paulum incrassatæ. *Pedes* plerumque ut in genere *Edusâ*.

This genus is based upon examples which are imperfect; it is, however, abundantly different from *Edusa* in its much more parallel, less robust, and more elongate form, in the less manifest inclination of the thorax, and in its more porrect head, and distinctly emarginate labrum.

1. *Ocnus viridis.*

Rugosus, viridis, pedibus rufis: *caput* punctatum, labro lævi rufo; *thorax* quadratus, fortiter punctatus; *scutellum* leviter punctis ad apicem ornatum; *elytra* parallela, depressa, transversè rugosa et punctata, rugis apud medium distinctis versus apicem obsoletis; *antennæ* pallide rufæ, apicibus fuscis; *corpus subtus* nigrum, abdomine nigro-viridi; *pedes* rufi.

Long. corp. lin. 3; lat. lin. $1\frac{1}{4}$.

XX. *Descriptions of New Species of* Bombyces *from North Eastern India.* By Frederic Moore.

[Read 5th June, 1865.]

1. Bombyx Sherwilli, n. sp. (Pl. XXII. fig. 1.)

Female.—Greyish-brown. Fore-wing with two dark brown curved lines near the base, and a third obliquely traversing the disc from the costa to the inner margin, two short lines at the end of the discoidal cell, and a submarginal line recurving from near the apex to the outer angle, the falcated space at the apex being fuliginous. Hind-wing darker brown, with numerous minute grey irrorations, and having a pale-margined submarginal line; on the inner margin are two black and white spots. Body with a dark ashy waistband and a black anal tuft.

Expanse of female 2½ inches.

Habitat. N. E. India (Capt. J. L. Sherwill).

Remark.—This species is allied to *Bombyx Huttoni*, Westw., but may be distinguished from it by being somewhat larger and of a greyer colour, the fore-wing having the apical patch fuliginous instead of black, and it has only a single transverse discal streak. A prominent character is that the abdomen is tipt with black. See this species noticed, *ante*, p. 324.

2. Saturnia Cidosa, n. sp. (Pl. XXII. fig. 2.)

Wings milky-white, each with an ordinary-sized black ocellus, with a yellow circle partly surrounded by a bluish-white lunule, and a central vitreous streak. Across the disc is a dark zig-zag double line, terminating at the apex by black streaks and bounded outwardly by a broad brown band; outer margin pale brown; near the base of the wing an irregular dark brown band, margined inwardly with pink. Thorax and abdominal tuft brown.

Expanse 4½ inches.

Habitat. N. E. India (Capt. J. L. Sherwill).

Remark.—This species is closely allied to *Sat. Pyretorum* (figured in Westw. Orient. Ent. pl. xxiv), but differs in the fore-wing in the broader and less dentated transverse zig-zag double line—this, at the apex of the wing, having the space beneath the lowest black streak white; the irregular transverse band before the ocellus is situated more towards the base of the wing, commencing from the base of the discoidal cell and not medially between it and the ocellus, as in *S. Pyretorum;* the extreme base of the wing is white. In the hind-wing the ill-defined transverse streak is nearer the base; and the submarginal band and the zig-zag double line are broader.

3. Saturnia Lindia, n. sp. (Pl. XXII. fig. 3.)

Greyish-brown, wings suffused with pink, each having a small black ocellus, with a reddish-brown circle, margined within on the inner half by a white lunule; a dark zig-zag double line across the disc, terminated on the fore-wing at the apex with a black streak and a pale space, the outer line being the darkest; between this and the outer margin is a double series of brown lunules; across the base of the wing from near the base of the discoidal cell to the inner margin is an irregular black line with an inner border of pink; nearer the base is a dark suffused streak; the front of the thorax is dark grey, the top of the same dark brown.

Expanse of male $3\frac{5}{8}$, female $3\frac{7}{8}$ inches.

Habitat. N. E. India (Capt. James Lind Sherwill).

Remark.—Allied to *Sat. Grotei*, figured in P. Z. S. (1859), Annulosa, pl. lxv. f. 2.

4. Loepa Miranda, n. sp. (Atkinson, MS.)

Wings buff-yellow. Thorax and costal margin of fore-wing, to within one-third of its length, purple-grey. Ocelli clay-brown, of an uniform oval shape, each having a pale central streak and a pure white curved line, the ocellus of the fore-wing being also bordered with black on its inner half. Both wings with an irregular transverse crimson line near the base, a single and a double zig-zag black line across the disc, the latter on the fore-wing terminating at the apex in a purple-grey and crimson patch divided by a short zig-zag white line, and having beneath it a small black patch; there is a submarginal series of double pale clay-brown lunules, the division between them being by a pale white line. The sexes are alike in colour and markings.

Expanse of ♂ $5\frac{1}{2}$ ins., of ♀ 5 inches.

Habitat. Darjeeling.

Remark.—For the discovery of this fine species of *Loepa* we are indebted to Mr. W. S. Atkinson of Calcutta. It may be known at once from *L. Katinka* (Westw. Orient. Ent. pl. xii. f. 2) by its much larger size. Having recently examined several specimens brought home by Mr. A. E. Russell, and which are now being distributed in various collections, I have taken this opportunity of securing the name which has been given to it by its discoverer.

DESCRIPTION OF PLATE XXII.

Fig. 1. *Bombyx Sherwilli.*

2. *Saturnia Cidosa.*

3. „ *Lindia.*

XXI. *Descriptions of New Genera and Species of* Phytophaga. By Joseph S. Baly, F.L.S.

[Read 5th August, 1865.]

List of new Species.

Scelodonta Murrayi.
Colasposoma igneicolle.
fulvicorne.
viridicæneum.
viridivittatum.
Podontia scaphoides.
maculatissima.
Mouhoti.
Blepharida Chiliensis.
Notozona histrionica.
flavipustulata.
Batesii.
Adorium tarsatum.
sordidum.
Hylaspes (n. g.) *longicornis.*
Buphonida (n. g.) *evanida.*
Agetocera lobicornis.
Hopii.
Cœlomera Batesii.
ornata.
Cinxia.

Fam. EUMOLPIDÆ.

Genus Scelodonta, Westw.

Scelodonta Murrayi.

Subelongata, subcylindrica, viridi-ænea, nitida, supra rugoso-punctata; thorace transversim elevato-strigoso; elytris tuberculatis.

Long. 2½ lin.

Hab. Old Calabar.

Bright metallic green. Head coarsely rugose, epistome produced at its apex into two ill-defined obtuse teeth, front flattened, impressed in the middle with a longitudinal groove, orbital

grooves strongly marked; eyes entire, prominent; antennæ scarcely more than half the length of the body, slender, their outer half black, five outer joints slightly thickened. Thorax rather longer than broad, sides rounded, notched at the base, slightly converging from just behind their middle to the apex, lateral border narrowly margined, finely crenulate; upper surface closely covered with numerous short transverse raised striæ. Elytra coarsely rugose-punctate, each with eight or nine longitudinal rows of tubercles, the rows absent from the basal portion of the inner disc near the suture, and from the transverse portion of the elytron immediately below the basilar space; towards the apex of the elytron the tubercles form short longitudinal costæ. Thighs armed beneath with a short acute spine.

Genus Colasposoma, Laporte.

Colasposoma igneicolle.

Late oblongum, convexum, viridi-æneum; tarsis antennisque (his basi fulvâ exceptis) piceis; thorace aureo; elytris læte metallico-cæruleis, margine laterali suturâque viridi-æneis.

Long. $2\frac{4}{5}$ lin.

Hab. Siam.

Head punctured, impressed between the upper portion of the eyes with an ill-defined semicircular groove; labrum and a space on the inner orbit aureous, a small patch at the base of either antenna bright metallic blue; antennæ nearly equal to the body in length, slender, filiform, four lower joints obscure fulvous, stained on their upper surface with piceous, basal joint stained above with a fusco-æneous patch. Thorax at the base nearly three times as broad as long; sides rounded at the base, obliquely converging and slightly rounded from behind their middle to the apex, lateral margin reflexed; upper surface deeply but not very closely punctured. Scutellum semiovate, igneo-æneous. Elytra nearly four times the length of the thorax, sides parallel, apex broadly rounded; above convex, transversely depressed below the basilar space, deeply but not coarsely punctured, the punctures arranged in ill-defined longitudinal striæ; on the outer disc in front are numerous coarse strongly-raised irregular transverse rugæ; on the hinder portion of the outer disc, as well as near the suture, are a number of elevated longitudinal costæ.

Colasposoma fulvicorne.

Late ovatum, convexum, subtus cæruleo- aut violaceo-æneum, supra viridi-æneum; antennis pallide fulvis, articulis duobus

ultimis apice piceis; capite thoraceque subremote punctatis; elytris fortiter subseriatim punctatis, antice rude transversim rugulosis, postice ad apicem longitudinaliter costatis.

Var. A. Corpore subtus nigro-piceo, supra cupreo.

Long. 3 lin.

Hab. Siam.

Head subremotely punctured, front impressed with a broad longitudinal groove; epistome triangular, its apex obsolete; labrum obscure fulvous. Thorax at the base nearly three times as broad as long; basal margin truncate and slightly oblique on either side, medial lobe nearly obsolete, its apex broadly obtuse; sides converging and slightly rounded from base to apex; upper surface smooth, subremotely punctured. Elytra each slightly excavated in the middle below the basilar space, coarsely punctured, interspaces raised into coarse irregular transverse reticulations; towards the apex of the elytra they form broad longitudinal costæ, which are most distinct near the suture and outer margin.

Colasposoma viridicæneum.

Anguste oblongo-ovatum, convexum, viridi-æneum; tarsis antennisque piceis, his basi fulvis; capite thoraceque fortiter et crebre punctatis, illo plano, utrinque intra insertionem antennarum longitudinaliter elevato, hoc ante apicem transversim costato; elytris fortiter punctatis, crebre transversim elevato-reticulatis.

Long. $2\frac{2}{3}$ lin.

Hab. Siam (Laos).

Bright metallic green, breast and abdomen rather more obscure than the rest of the body. Head closely and coarsely punctured, subrugose; face depressed and flattened between the eyes, the lateral margin of the depressed portion thickened and forming a raised longitudinal edge close to the insertion of each antenna, sutural lines between the epistome and face entirely obsolete; labrum and palpi pale fulvous. Thorax more than three times as broad as long, basal margin truncate on either side, medial lobe distinctly produced; sides rounded, converging in front; upper surface closely and deeply punctured, immediately behind the apical border is a narrow transverse distinctly raised line, which extends about one-fourth part across the thorax.

Colasposoma viridivittatum.

Late ovatum, convexum, obscure cupreo-piceum, supra aureo-cupreum; antennis fulvis, articulis quinque ultimis apice infuscatis; capite thoraceque crebre punctatis, illo facie inferiori, hoc limbo viridi-æneis; elytris fortiter subcrebre punctatis, extus ad latera transversim elevato-rugulosis, limbo angusto (basi prætermissâ) vittâque latâ à basi fere ad apicem extensâ viridi-æneis.

Long. 3 lin.

Hab. Banks of the Niger.

Face excavated between the eyes, the extreme vertex, together with the lower two-thirds of the epistome, metallic green; labrum fulvous, the whole surface of the head closely covered with oblong punctures, epistome obliquely strigose. Thorax at its base nearly three times as broad as long, sides rounded and narrowed from base to apex, anterior and posterior angles acute; upper surface closely covered with somewhat oblong punctures, the centre of the disc rather less closely punctured. Elytra more deeply but less closely punctured than the thorax, the punctures arranged in ill-defined longitudinal striæ; the surface below the basilar space not depressed.

Fam. GALLERUCIDÆ.

Sub-fam. HALTICINÆ.

Genus Podontia, Dalm.

Podontia scaphoides.

Elongato-ovata, postice paullo attenuata, convexa, fulvo-fusca, nitida; antennis extrorsum, pectore, femorum apice tibiisque piceis; thorace ante medium utrinque flexuoso-impresso, basi breviter bisulcato; elytris obscure fusco-fulvis, flavo-irroratis, fortiter punctato-striatis, striis apicem versus leviter sulcatis, punctis piceis.

Long. 4—4½ lin.

Hab. Northern China.

Antennæ scarcely half the length of the body, four lower joints flavous, the rest piceous. Thorax more than twice as broad as long, sides straight and parallel, converging in front, anterior angles produced into a short slightly recurved tubercle; upper surface smooth, the anterior impressions strongly incurved, their apices almost confluent; from about the middle of their outer

edge a single row of punctures extends halfway to the lateral margin; on each side just within the outer border are two distinct foveæ; in the middle, immediately in front of the basal margin, is a third, less defined; the general surface of the disc finely but subremotely punctured. Elytra narrowly ovate, narrowed towards their apex, strongly punctate-striate, the striæ lightly sulcate toward their apex, where also their interspaces become obsoletely convex; near the apex of each elytron is a large moderately deep depression; the small flavous spots are scattered irregularly over the whole surface of the elytra.

Podontia maculatissima.

Elongata, convexa, fulvo-picea, nitida; antennis (basi exceptâ) nigris; thorace ante medium utrinque oblique impresso, basi longitudinaliter bisulcato; elytris pallide castaneis, basi et ad latera nigris, fortiter punctato-striatis, striis (præsertim ad apicem) sulcatis, interspatiis convexiusculis, pustulis flavis numerosis seriatim dispositis ornatis.

Long. 5 lin.

Hab. Port Essington, Australia.

Thorax twice as broad as long, sides subparallel, sinuate behind their middle, slightly produced just beyond the latter, thence quickly converging to their apex, anterior angles tuberculate; basal margin sinuate on either side, medial lobe slightly produced; upper surface smooth; on either side in front is an oblique groove, which commences at a little distance within the anterior angle and terminates just below the middle of the thorax; from its outer edge a transverse branch is given off which passes almost directly outwards to about the middle of the lateral margin, its surface being impressed with a single row of deep punctures; on either side at the base is a short longitudinal sulcus, external to which, between it and the outer border, is a deep fovea; the whole surface of the disc is free from punctures, with the exception of a broad semicircular space on its hinder portion, which is impressed with large deep punctures. Elytra narrowly ovate, slightly narrowed posteriorly, sides nearly parallel, each elytron impressed with eleven rows of deep punctures, the first row short; the punctures are regularly placed in a single line on each stria; the striæ (the middle of the basal portion of the disc excepted) sulcate.

Podontia Mouhoti.

Elongata, convexa, castanea, nitida; antennis elytrisque flavis, his picco-marmoratis, fortiter punctato-striatis, striis apicem

versus sulcatis, punctis piceis; thorace basi longitudinaliter bisulcato, antice utrinque flexuoso-impresso.

Long. 5 lin.

Hab. Mountains of Laos, Siam; collected by the late M. Mouhot.

Very similar in form, sculpture and coloration to *P. maculatissima*; narrower than that insect, and the pattern on the elytra differently arranged. Antennæ flavous, rather more than half the length of the body. Thorax narrower than in *P. maculatissima*, the two anterior grooves more strongly flexuose, and the branch which they send from the middle of their outer edge shorter and not reaching more than halfway to the lateral border; on either side at the base, placed just within the short longitudinal groove, is a large patch of coarse deeply impressed punctures. The elytra are punctured in a similar manner to the preceding insect, the striæ are, however, not impressed on the anterior half of the surface, but are more deeply sulcate on the hinder portion, the interspaces (plane in front) becoming strongly convex behind; the castaneous markings are chiefly congregated in masses, which form three large ill-defined transverse patches, placed longitudinally down the middle of the back.

Genus Blepharida, Chevr.

Blepharida Chiliensis.

Anguste ovata, valde convexa, pallide rufo-fusca, nitida; capite thoraceque fulvis; antennis (basi exceptâ) nigris; elytris fortiter punctato-striatis, punctis piceis, striis (præsertim ad apicem) sulcatis, vittâ submarginali irregulari latâ maculisque numerosis disci albidis.

Long. 3½ lin.

Hab. Chili.

Antennæ moderately robust, half the length of the body, four lower joints obscure fulvous, stained above with piceous, the rest black; face coarsely but not closely punctured, vertex nearly impunctate. Thorax more than twice as broad as long, sides obtusely rounded, converging in front, anterior angles produced into an obtuse tubercle, hinder angles rounded, nearly obsolete; upper surface irregularly punctured. Elytra impressed each with eleven regular rows of deep piceous punctures, the first row short; rows distinctly but slightly sulcate on the sides and towards the apex of the elytron, interspaces flat, obsoletely convex towards their apex; each elytron covered with a number of small irregular

very pale yellowish-white spots; in addition, near the outer border, is a broad irregularly-defined submarginal stripe of the same colour; this stripe, commencing at the humeral angle, continues entire for two-thirds of the length of the elytron, it then becomes gradually broken up and lost in the general colouring of the surface. Four hinder tibiæ armed each with a short stout obtuse tooth.

Genus Notozona, Clark.

Notozona histrionica.

Anguste ovata, valde convexa, corallina, nitida; antennis extrorsum scutelloque nigris; antennarum basi elytrisque flavis, his regulariter punctato-striatis; margine laterali, suturâ ad apicem, maculis magnis tribus (duabus infra basin, unâ ante apicem), fasciâque latâ centrali utrinque abbreviatâ, nigris; femoribus posticis subtus unispinosis.

Long. 4 lin.

Hab. Mexico.

Antennæ rather more than half the length of the body, five upper joints black, the basal one fulvous, the remaining joints, together with the base and apex of the seventh, yellow. Thorax three times as broad as long, sides slightly rounded and converging from base to apex, anterior angles produced into a slightly recurved subacute tubercle; hinder angles distinct, obtuse; basal margin sinuate on either side near the middle portion, which is obtusely lobed; upper surface faintly excavated within the lateral border; the base impressed on either side with an indistinct fovea; on the hinder disc, just in front of the base, is also a small shallow depression; surface minutely but not closely punctured; on the middle of the thorax is a single semicircular row of larger punctures, which, commencing on either side on the apical border, extends backwards two-thirds across the disc. Elytra impressed each with eleven rows of distinct punctures, placed in a single regular line on each row, the first row short, interspaces smooth, impunctate, very faintly convex, the extreme lateral margin, together with the hinder half of the suture, narrowly edged with black; at the apex of the lateral border, as also on the suture, a very narrow line of rufous is interposed between the black colour and the edge of the elytron, so that the black line becomes submarginal; on each elytron are three large black patches and a broad transverse band of the same colour; this band, which is placed across the middle, is abbreviated on both the extreme sutural and lateral borders; of the patches

two are parallel, and placed just below the basal margin, the outer one subtrigonate and attached by a slender line to the base itself, the inner one subrotundate; the third, also subrotundate, occupies the middle disc about halfway between the transverse fascia and the apex of the elytron. Body beneath clothed with coarse fulvous hairs. Hinder thighs very robust, armed beneath with a short stout tooth.

Notozona flavipustulata.

Elongato-ovata, convexa, rufo-testacea, nitida; antennis, tibiis tarsisque piceis, femoribus flavis, apice rufo-piceis; elytris distincte punctato-striatis, singulis apice et pustulis magnis tribus flavis.

Long. $3\frac{3}{4}$ lin.

Hab. Brazil.

Head short; labrum flavous; facial plates subquadrate; antennæ four-fifths the length of the body, piceous, paler towards the apex. Thorax nearly three times as broad as long, sides rounded, scarcely converging in front, anterior angles thickened, hinder angles nearly obsolete; upper surface finely but not closely punctured; in the middle, just in front of the basal margin, is a short ill-defined transverse depression. Elytra distinctly punctate-striate, the punctures placed irregularly on each stria; the flavous patches are all transverse, and are arranged as follows: one at the base; another about the middle, slightly oblique, and forming a broad fascia abbreviated at either end; whilst the third, which also forms an abbreviated band, is placed about halfway between the middle and the apex.

Notozona Batesii.

Elongato-ovata, convexa, flava, nitida; antennarum articulis intermediis, tibiis tarsisque nigris; elytris distincte punctato-striatis, singulis puncto humerali maculisque tribus inter se et cum illis elytri alterius sæpe confluentibus pallide castaneis.

Long. $3\frac{3}{4}$ lin.

Hab. Amazons.

Antennæ rather more than half the length of the body, four lower joints obscure flavous, stained with piceous above, three upper joints dirty white, the others entirely black. Thorax very similar in form and punctuation to *N. flavipustulata*, but without the transverse depression at its base. Elytra punctured as

in *N. flavipustulata;* the spots on the surface of each are placed longitudinally on the middle disc, one below the base; the second, about the middle, is attached at the suture to its fellow on the opposite elytron; the third, larger than the others, is placed halfway between the middle and the apex, and is also confluent at the suture, frequently sending a ramus along the suture itself to join the second patch.

Sub-fam. GALLERUCINÆ.

Genus Adorium, Fabr.

Adorium tarsatum.

Ovale, sordide flavo-album; oculis antennisque extrorsum nigris; thorace tenuissime, elytris tenuiter punctatis; subtus nigro-piceum, abdominis vittâ centrali segmentorumque marginibus albo-flavis; pedibus flavo-albis, femorum maculis, tibiis apice tarsisque nigro-fuscis.

Long. 6 lin.

Hab. Northern China.

Subdiaphanous. Face impressed with a deep triangular fovea, at the apex of which is a small black spot; antennæ less than half the length of the body, robust, slightly thickened towards their apex, third joint equal to the fourth, five apical joints black, the sixth fuscous. Thorax rather more than twice as broad as long, sides rounded, converging towards the apex, their lateral border slightly but distinctly reflexed; surface of disc minutely punctured. Elytra ovate, their basal margin slightly excavated; surface finely punctured, humeral callus bounded externally by a semilunate depression; lateral margin moderately dilated, shoulders scarcely prominent in front, obliquely rounded.

Adorium sordidum.

Late ovatum, pallide fulvo-fuscum, corpore subtus pedibusque fusco-variegatis; tarsis, abdominis maculis, antennarumque articulis 5 ultimis nigro-fuscis; thorace tenuissime punctato; elytris sordide fulvis, distincte subcrebre punctatis, margine laterali modice dilatato, pallide fulvo-fusco.

Long. $5\frac{1}{2}$ lin.

Hab. Northern China.

Broader and shorter than *A. tarsatum*. Face impressed with a triangular fovea; antennæ robust, filiform, the third joint scarcely longer than the fourth. Thorax more than twice as broad as

long, sides rounded, converging towards their apex, broadly reflexed; upper surface minutely punctured. Scutellum triangular. Elytra very slightly excavated at their base, sides moderately dilated, shoulders obliquely rounded; upper surface distinctly punctured; humeral callus bounded externally by a curved groove.

Genus Hylaspes.

Corpus oblongum, convexum. *Caput* exsertum, parvum; *facie* perpendiculari, trigonâ; *oculis* prominulis, ovato-rotundatis, integris; *antennis* 11-articulatis, corporis longitudine paullo longioribus, serratis, articulo 1mo curvato a basi ad apicem incrassato, 2do et 3tio minutis æqualibus, cæteris compressis, singulis longitudine tribus præcedentibus æqualibus, basi angustatis, intus ad apicem angulato-dilatatis. *Thorax* transversus, utrinque transversim sulcatus. *Elytra* thorace latiora, parallela, convexa, infra basin non transversim impressa, punctato-striata. *Pedes* sat elongati; *coxis* anticis contiguis; *femoribus* posticis non incrassatis; *tibiis* posticis quatuor apice spinâ minutâ armatis. *Mesosternum* obsoletum. *Metasternum* inter coxas intermedias in spinam validam obtusam productum.

Type *Hylaspes longicornis*.

The peculiar form of the antennæ will at once distinguish the present genus from *Laphris*, *Doryxena*, and other allied forms with which it has in common a metasternal spine.

Hylaspes longicornis.

Elongato-oblonga, flava, nitida; antennis (basi exceptâ) tibiis tarsisque nigris.

Long. 5 lin.

Hab. Himalayas.

Pale yellow. Head smooth; epistome flat, trigonate; eyes black; antennæ rather longer than the body, tapering at the base and apex, their three lower joints fulvous, the rest black. Thorax twice as broad as long, sides straight, narrowly margined, anterior angles oblique, thickened; upper surface impressed with a broad transverse groove, which is less deep and nearly interrupted in the centre of the disc; surface remotely punctured. Elytra parallel, regularly rounded at their apex, convex, finely punctate-striate, the puncturing less regular and less distinct on the sides and apex.

Genus Buphonida.

Corpus elongatum, modice convexum. *Caput* exsertum, suprà tumidum; *facie* brevi, perpendiculari; *antennis* gracilibus, filiformibus, articulo 3tio quarto breviori; *oculis* prominulis, integris. *Thorax* transversus, dorso plus minusve transversim excavatus. *Scutellum* trigonum. *Elytra* thorace latiora, apicem versus paullo ampliata, apice rotundata, modice convexa, dorso plus minusve deplanata, irregulariter punctata, pube adpressâ brevi vestita, limbo inflexo obliquo, ante medium desinente, interdum obsoleto. *Pedes* graciles; *coxis* anticis erectis, contiguis; *femoribus* posticis non incrassatis; *tibiis* omnibus apice muticis; *unguiculis* bifidis, aut acute appendiculatis.

Type *Buphonida evanida*.

The swollen head separates this genus from *Galleruca*, next to which it must be placed.

Buphonida evanida.

Elongata, convexa, fusco-fulva, nitida; oculis nigris; elytris crebre punctatis, pallide rufo-violaceis, metallico vix tinctis, limbo laterali vittâque suturali, hac postice abbreviatâ, metallico-cæruleis.

Long. 4 lin.

Hab. Southern India.

Head strongly exserted, smooth and shining, glabrous, finely but somewhat distantly punctured, the whole impressed with a fine longitudinal groove, which extends from the front edge of the epistome backwards to the neck; epistome and facial plates transverse; eyes black; antennæ two-thirds the length of the body. Thorax short, three times as broad as long, surface glabrous, impunctate on the disc, sides finely but not closely punctured; on either side is a deep transverse groove. Elytra much broader than the thorax, nearly five times its length, sides distinctly dilated posteriorly; closely punctured, clothed with adpressed fulvo-fuscous hairs.

Genus Agetocera, Hope.

Agetocera lobicornis.

Subelongata, robusta, convexa, pallide rufo-fulva, nitida; antennis flavis; genubus, tibiis, tarsis elytrisque nigris.

Mas.—Antennarum articulis 2do ad 8^{vum} brevibus, 9no elongato, valde incrassato, extus leviter excavato, apice extus in

lobum compressum obtusum oblique producto, 10mo ad 12^{mum} filiformibus.

Fœm.—Antennis subfusiformibus, articulis cylindricis non dilatatis.

Long. $5\frac{1}{2}$ lin.

Hab. India.

Head elongate, front impressed with a deep fovea, eyes and apex of jaws black. Antennæ entirely flavous; basal joint (♂) thickened; second short, moniliform; third and fourth nearly equal, each rather longer than the second, obconic; fifth rather shorter than the fourth; sixth, seventh and eighth very short, transverse, gradually increasing in thickness (all the preceding joints are cylindrical, and truncate at their apices); ninth equal in length to the four preceding, greatly swollen, its outer edge lightly excavated, its apex at the outer angle strongly produced into a flattened obtuse lobe; three following joints filiform, of normal thickness, gradually tapering to the apex, conjointly rather longer than the ninth joint: in the ♀ the antennæ are lightly subfusiform, the joints being entirely cylindrical and of normal form; the basal joint is moderately thickened; the second short, obconic; the third more than one-half longer than the second; the fourth and fifth equal, and each rather longer than the third (the three preceding joints gradually increase in thickness from base to apex); the sixth and two following nearly equal in length (the seventh rather the longest), rather shorter than the fifth, somewhat thicker than the preceding; ninth, tenth and eleventh equal, slightly elongate; twelfth shorter, acute; the last three joints gradually diminish in thickness from the ninth. Thorax transverse, sides narrowly margined, their anterior half dilated; upper surface smooth, sparingly punctured, impressed just behind the middle with a deep bisinuate groove. Scutellum semiovate, its apex obtuse. Elytra oblong, slightly dilated posteriorly, convex, each impressed with a broad sulcation, which, running close to the suture and bounding the inner margin of the basilar space, curves outwardly along the lower edge of the latter and terminates at the junction of the inner and outer discs; about the middle of each elytron, near the lateral margin, is a broad transverse excavated space; general surface obsoletely punctured.

Agetocera Hopii.

Subelongata, robusta, convexa, flavo-fulva, nitida; antennis apice, tibiis (basi exceptâ) tarsisque nigris; elytris obscure purpureis, subcrebre punctatis.

Mas.—Antennarum articulis 2do ad 7^mum^ brevissimis, 8vo elongato, valde incrassato, 9no difformi, extus valde emarginato, cæteris filiformibus, duobus ultimis nigris.

Fœm.—Antennis filiformibus.

Long. 6 lin.

Hab. Northern India.

The male of this species may at once be known from the same sex of the preceding insect by the eighth joint of its antennæ being the most swollen (instead of the ninth), the apex of this joint being obtuse and without the slightest trace of lobe or process; the ninth joint, however, is also dilated and compressed, and has its outer edge deeply notched; the three terminal joints are longer, rather more slender, and of equal thickness throughout; front smooth, impressed with a large deep fovea. Thorax rather broader, sides dilated in front as in *A. lobicornis;* upper surface smooth and shining, impunctate, impressed behind the middle with three deep foveæ, two transverse, placed one on either side, are the remains of the transverse sulcation found in the former species; the third, shallower and less distinct, is placed in the middle, rather behind the two others, just in front of the basal margin. Elytra sulcate at their base and with the transverse lateral excavation as in *A. lobicornis;* in addition, a broad sulcation extends nearly the whole length of the elytron just within the lateral border. In the ♀ the antennæ are filiform, very slightly tapering to the apex: second joint short; third, fourth and fifth each about the length of the first; sixth to the eighth each rather shorter, equal; ninth about equal to the first and second; tenth and eleventh gradually increasing in length; these three last joints rather less robust than the preceding.

Genus Cœlomera, Erichs.

Cœlomera Batesii.

Læte metallico-cærulea aut purpurea, viridi vix tincta, subtus pube adpressâ fulvâ dense vestita; antennis nigris; thorace elytrisque crebre punctatis et pube brevissimâ indutis, his ♂ valde, ♀ modice ampliatis, fasciâ latâ fulvâ prope medium positâ ornatis.

Long. 9 lin.

Hab. Upper Amazons.

This species is very closely allied to *C. equestris,* Fab.; the latter insect is bright metallic green on the upper surface of the body, its elytra being at the same time more closely and coarsely

punctured and almost granulose; the transverse fulvous band is also much narrower in the middle and somewhat dilated posteriorly on either side as it approaches the lateral border of the elytron, its hinder margin thus forming a regular curve, the convexity of which is directed forwards: in *C. Batesii* the hinder edge is almost straight; in all its other characters the present species agrees entirely with *C. equestris*.

Cœlomera ornata.

Nigra, subtus pube adpressâ tenuissimâ vestita; elytris ♂ valde ampliatis, brevissime fulvo-sericeis, crebre punctatis, subgranulosis, fulvis, subopacis, plagâ magnâ ovatâ transversâ vix pone medium positâ, vittâ latâ suturali a basi ad plagam extensâ, plagâque humerali subelongatâ a humero fere ad medium continuatâ, obscure viridibus aut cæruleis.

Long. 9 lin.

Hab. Bogotà.

Almost entirely similar in form to *C. Batesii*, but rather more flattened above. Thorax finely and less closely punctured, broadly excavated transversely, disc glabrous, sides clothed with a few silky hairs. Body beneath somewhat sparingly clothed with fine silky pubescence.

Cœlomera Cinxia.

Nigro-picea, pube adpressâ fulvo-fuscâ vestita, suprà fulvo-testacea, subnitida; oculis antennisque nigris; elytris postice late explanatis, crebre punctatis, pube brevissimâ obsitis, parte tertiâ apicali cæruleis.

Long. 7 lin.

Hab. Upper Amazons.

Closely resembling *C. Batesii* in form, but distinguished from that species and from *C. ornata* by its totally different coloration. The third joint of the antennæ is about equal in length to the first and second taken conjointly, and nearly twice as long as the fourth; the fifth equal to the fourth; the sixth and four following joints gradually decrease in length; the eleventh is rather longer than the tenth. Thorax transversely concave, sides deeply excavated, lateral border reflexed in front.

XXII. *Characters of a new Genus and Species of* Chalcidites. *By* F. Walker, F.L.S.

[Read 2nd October, 1865.]

The Hymenopterous insect here mentioned is from North Australia, and is in the possession of F. Smith, Esq., who has kindly allowed me to describe it. Its apparent resemblance to some of the ant tribe is very striking, and the purpose of this mimicry has been often noticed in recent publications. It seems to have most affinity to the *Cleonymidæ;* but like some other exotic genera it has a peculiar structure, which distinguishes it from all the hitherto defined groups of *Chalcidites.*

Genus Myrmecopsis.

Mas.—Corpus robustum, apterum. Caput scabrum, sparse pubescens, transversum, thorace non angustius; facies transverse sulcata. Oculi magni. Ocelli tres. Mandibulæ parvæ. Antennæ flagelliformes, apud os insertæ, thorace vix breviores; articulus 1us facie non brevior; 2us elongatus; 3us 1mo dimidio, 2do duplo longior; 4us et sequentes breves; 13us longè conicus, 12mo longior. Thorax scaber, sparse pubescens. Prothorax transversus, quadratus, bene determinatus; latera marginata. Mesothorax brevissimus; scutum parapsidum suturis distinctis; scutellum scuto multo brevius. Metathorax quadratus, bene determinatus, mesothorace brevior, margine postico setoso aciculato bidentato. Petiolus brevissimus. Abdomen ellipticum, glabrum, convexum, apice setosum, thorace latius et multo brevius, segmento uno dorsali. Pedes robusti; tibiæ calcaribus parvis; tarsi subarcuati, 5-articulati; femora antica subincrassata.

Male.—Body stout, with hardly any rudiments of wings. Head and thorax scabrous, thinly pubescent. Head fully as broad as the thorax; face vertical, with transverse furrows. Eyes large, not prominent. Ocelli three, as usual. Mandibles small. Antennæ nearly as long as the thorax, inserted close to the mouth, increasing in breadth from the 1st joint to the 7th, tapering thence to the tips; 1st joint or scape as long as the face; 2nd elongate; 3rd

twice the length of the 2nd, and more than half the length of the 1st; all the following joints short, 13th elongate, conical, longer than the 12th. Prothorax quadrate, much developed, broader than long, with a slight rim along each side. Mesothorax very short, hardly as broad as the prothorax. Scutum hardly half the length of the prothorax; sutures of the parapsides distinct. Scutellum much shorter than the scutum. Metathorax quadrate, well developed, shorter than the mesothorax; hind border with a short stout spine on each side, and with a ridge in the middle. Petiole extremely short. Abdomen elliptical, smooth, shining, convex, broader and very much shorter than the thorax, with only one dorsal segment; tip setose. Legs stout; tibiæ with two short apical spurs; tarsi 5-jointed, slightly curved, the joints successively decreasing in length; fore-femora slightly incrassated.

Myrmecopsis nigricans.

Mas.—M. viridi-nigra; antennæ nigræ, basi fulvæ; abdomen cupreo-nigrum; pedes rufi, tarsis nigricantibus.

Male.—Greenish black. Antennæ black; 2nd, 3rd, 4th and 5th joints tawny. Abdomen cupreous-black. Legs red; tarsi blackish.

Length of the body, $2\frac{3}{4}$ lines.

Hab.—Northern Australia.

XXIII. *Remarks on Captain Hutton's Paper "On the Reversion and Restoration of the Silkworm." By* Captain J. Mitchell, Superintendent of the Government Museum, Madras. (Communicated by the Secretary.)

[Read 6th November, 1865.]

The passage in Captain Hutton's Paper with which my remarks are concerned is as follows :—

"In the introductory remarks to my 'Monograph on the Genus *Attacus*,' I have shown, after Kirby and Spence and other authorities, that the gum from the reservoirs, being conveyed to the mouth by the constriction of certain muscles, passes through two small orifices in the lip, *and the two fibres thus formed, being taken up and twisted together by the hook-like processes in the mouth appointed to that office, become one fibre of silk on coming into contact with the cold external air.*"* (The Italics are mine.)

Now it is quite certain the authorities referred to by Captain Hutton could not have examined, with sufficient optical assistance, silk taken directly from the cocoon, or they would have seen that no such twisting takes place, but that the two filaments are laid side by side in the cocoon, and adhere together until separated by the solution of the gum in the process of manufacture. I have examined cocoons, and reeled raw silks, contained in the Museum Collection, and have, in every instance, found a double filament. But in bleached spun silk the filaments are single, because the gum which held them together has been washed away in the process of bleaching.

I have only the introduction to Kirby and Spence, which does not contain the information referred to by Captain Hutton, but I am aware that other writers, upon whose authority we *ought* to be able to rely, have stated that the silkworm spins a single thread—such, for instance, as T. R. Jones, at p. 297 of the first edition of his undoubtedly interesting work "A General Outline of the Animal Kingdom;" Dr. Carpenter, at p. 110 of the second volume of his "Zoology;" "The Micrographic Dictionary," at p. 360 of the first edition, article "Spinning Organs;" and there are probably other authorities that might be quoted who have said

* *Vide ante*, p. 159.

that the filament is single. A correct description of the way in which the silk is deposited in the cocoon will be found at p. 200 of Adams' Essays on the Microscope, published nearly seventy years since.

It is, I believe, commonly supposed that the silk spun by every species of silk-producer, that is usually manufactured, is alike in form; but that is not the case. All the ordinary silk that I have examined is cylindrical, or nearly so; but the common Tussah silk, from *Antheræa Paphia*, is flat, and I have satisfied myself that each filament consists of a large number of very fine fibres held together by some substance that makes it very difficult to separate them. I have, however, succeeded so far as to justify me in saying that the filament is compound, and that the finest fibres I have obtained measure about $\frac{1}{35000}$th of an inch in diameter.

The filaments spun by *Attacus Atlas* and *Actias Selene* also appear to be compound, but the structure is not so marked as in *Antheræa*, and I have not yet tried to separate their fibres.

The foregoing remarks on Tussah silk are founded on observations made some days since. I have just had time before closing this letter to re-examine some that have been in water for many days, and I find the filaments are gradually breaking up into their component fibres, and I hope they will eventually all separate and enable me to mount specimens for permanent record.

I have only to add that, having had occasion to write to Captain Hutton, I pointed out the mistake about the filament, and he said in reply, that if I had discovered the two filaments were laid side by side and not twisted, I ought to make the fact known, as at present the idea prevailed amongst Entomologists that the two fibres were twisted after issuing from the orifice in the lip.

XXIV. *On the British Species of* Agathidium. *By* David Sharp.

[Read 6th November, 1865.]

Through the kindness of my Entomological friends, I have recently been able to examine the specimens of our native *Agathidia* contained in most of the principal collections, and have thought the following short notes on the genus might not be altogether unacceptable. I have also examined the Stephensian collection in the British Museum, and believe the account given below of the insects placed in that collection under the generic name of *Agathidium* will be found correct.

Stephens in his "Illustrations of British Entomology" has described three species of *Agathidium*, which he supposed to be undescribed by foreign authors, viz:—*Agathidium ruficolle*, *A. affine*, and *A. rufipes;* and for the first two of these he cites the names of *Dermestes ruficollis*, Marsham, and *Dermestes affinis*, Marsham. Neither of these names is used in the following descriptions of the British species, for *D. ruficollis*, Marsham, is synonymous with the previously-described *Amphicyllis globus* of Paykull, and though the Stephensian type of *Ag. affine* is an example of the species subsequently described by Erichson as *A. lævigatum*, I do not think Marsham's name can be adopted, his (as also Stephens') description being totally inadequate to allow a foreign author to recognize the species intended to be so designated; nor do I think it advisable that a name now so well known as that given to this species by Erichson should be supplanted on the mere authority of a type; (there being, moreover, two other species in Stephens' cabinet of which the type is a specimen of *A. lævigatum*, Erich.) Of *Agathidium rufipes* there is no type in the author's cabinet; and it is quite impossible from the description to ascertain to what species it is intended to apply.* For these reasons, therefore, I have adopted the names unanimously used by foreign writers on the genus.

1. Of *A. ruficolle* there are three examples in Stephens' cabinet; they are all *Amphicyllis globus*, Payk.

* Erichson, however, gives *A. rufipes*, Steph., as a synonym of *A. atrum*, Paykull; and, perhaps, on the whole, the description in the "Illustrations" is most applicable to the species generally known by the latter name.

2. Of *A. globus* the only specimen is much mutilated, but appears to be a pale variety of *A. nigrinum*, Sturm.
3. *A. atrum*, four examples; the type is *A. atrum*, as are also two of the others; the fourth being *A. lævigatum*.
4. *A. ferrugineum*, one specimen; it is a pale variety of *A. nigrinum*, Sturm.
5. *A. seminulum*, two specimens; the one supposed to be the type is *A. marginatum*, Sturm, the other being really *A. seminulum*.
6. *A. orbiculatum*, two examples, both of which are *A. lævigatum*, Erichson.
7. *A. mandibulare*, a single specimen; it is *A. marginatum*, Sturm.
8. *A. nigrinum*, four specimens; the type is *A. lævigatum*, as are also the other three examples.
9. *A. affine*, one specimen; it is also *A. lævigatum*, Erichson.
10. *A. carbonarium*, two specimens; the type has a label marked "aquaticum" attached to it; both are *Chætarthria seminulum*.
11. *A. minutum*, two specimens, both of which belong to the genus *Clambus*.
12. *A. nanum*, seven specimens, all of which are, I think, *Clambus pubescens*.

Thomson in his "Skandinaviens Coleoptera" has separated three species of *Agathidium* (*A. lævigatum*, *A. seminulum* and *A. badium*) from the rest of the genus, and made for them a new genus, *Cyphocebe*; this, however, I have not been able to retain, for its characters are not constant in the three species that compose it. For instance, *A. lævigatum*, Erich., and *A. seminulum*, Linn., are considered to belong to *Cyphocebe*, whilst *A. atrum*, Paykull, is still left in the genus *Agathidium*; and yet there is as much difference in the structure of the metasternum between *lævigatum* and *seminulum* as between *lævigatum* and *atrum*; on the other hand *seminulum* approaches *atrum* in the relative position of the coxæ more than *lævigatum* does.

1. *Agathidium nigripenne*, Kugel.

Head and thorax bright red, extremely finely and obsoletely punctured; elytra black, rather thickly and not finely punctured, with a well marked sutural stria extending from the apex nearly to the base; legs and antennæ red, the two first joints of the club of the latter rather darker, 7th joint larger than either the 6th or

8th. ♂ with the anterior tarsi dilated, an obtuse tooth at the apex of the posterior femora, and a very minute fasciculus of hairs on the metasternum.

Long. 1—1¼ lin.

The bright scarlet colour of its head and prothorax at once distinguishes this pretty species from all its congeners. It appears to be very rare (if found at all) in the south, but is not uncommon in the north of England and in Scotland, at the oozing sap of recently-felled trees.

2. *Agathidium seminulum*, Linn.

Above pitchy black, underside, with the legs and antennæ, pitchy red; head and prothorax very finely and obsoletely punctured; elytra with a well marked sutural stria extending from the apex more than half-way to the base, their punctuation rather fine and close; metasternum with the middle of the anterior part much depressed towards the front and very evidently separated by a well-marked margin from the posterior part. ♂. Anterior and middle tarsi dilated; apex of posterior femora truncate, and with an obtuse tooth.

Long. 1 lin.

Not common, but found sometimes among dead leaves and moss. I have no proof of its occurrence in the north of England or Scotland.

3. *Agathidium lævigatum*, Erich.

Black, with the sides of the thorax, legs, and antennæ pitchy brown, the first two joints of the club darker; upper surface impunctate and without any sutural stria on the elytra; metasternum with a middle space not much depressed towards the front, and evidently separated by a margin from the posterior part. ♂ with the anterior and middle tarsi dilated; metasternum with a small brush of hairs arising from a slight depression.

Long. 1 lin.

Common all over the country, occurring among refuse vegetable matter and sometimes in sandpits.

4. *Agathidium atrum*, Payk.

Black, with the sides of the thorax, legs and antennæ pitchy brown, club of the latter sometimes darker and the third joint very long (about as long as the three succeeding); head and elytra rather closely and evidently, thorax very finely and obso-

letely, punctured; sutural stria of the elytra well marked and extending more than half-way to the base; metasternum with a slightly curved transverse line. ♂ with the anterior and middle tarsi dilated at the base, posterior femora truncate at the apex and with a well-marked acute tooth; metasternum with a bunch of hairs arising from a shallow fovea.

Long. $1\frac{1}{3}$ lin.

Differs from *A. seminulum* in its larger size, darker colour, more evidently punctured head, longer third joint to the antennæ, and the different structural characters of the ♂. Common both in England and Scotland among dead leaves and moss, occurring also now and then in sandpits.

5. *Agathidium varians*, Beck.

Brownish-yellow, shining, disc of the thorax and elytra pitchy red, the club of the latter darker; head with largish but faintly impressed and distant punctures, with two shallow foveæ between the eyes, and an ill-defined transverse impression where the thorax meets it; thorax extremely finely and obsoletely punctured; elytra with a sutural stria reaching quite half-way to the base, almost impunctate. ♂ with the anterior and middle tarsi slightly dilated, and with a slender but elongate bunch of setæ on the centre of the metasternum; ♀ with the tarsi 4, 4, 4. The ♂ sometimes, though rarely, has the left mandible a little prolonged and bent at the apex.

Long. 1 lin.

Found sometimes in considerable numbers among refuse vegetable matter, moss, etc., both in the north and south of England and in Scotland.

6. *Agathidium clypeatum*, nov. sp.

Piceum, prothoracis limbo, antennarum scapo, pedibusque testaceis; capite fere lævigato, clypeo depresso; prothorace parce et obsolete, elytris parce sed evidentius punctatis, his stria suturali medium attingente.

♂ tarsis anterioribus et intermediis dilatatis; metasterno fasciculo pilorum parvo instructo; mandibula sinistra elongata, falcata.

♀ tarsis 4, 4, 4.

Long. $\frac{4}{5}$—1 lin.

Colour and size of *A. varians*, but not quite so broad and rather more acuminate behind. The underside, the basal eight joints of the antennæ, and the legs and margins of the thorax, testaceous. Club

of the antennæ black; these are short and with the third joint not so long as the two succeeding. The head is very sparingly and obsoletely punctured, the punctures more evident behind the eyes. The clypeus is depressed, so as to leave the front of the head emarginate. Thorax rather narrower than the elytra, its sides faintly and sparingly, the disc extremely finely and obsoletely punctured. Elytra with the humeral angles well marked but very obtuse, sparingly and finely punctured, with a sutural stria extending more than half-way. In the male the left mandible is produced into a long pointed horn.

This species is perhaps the *A. piceum* of Erichson, but the humeral angles seem to be not so rectangular as the description of that species would lead one to expect. Moreover Erichson says nothing of the remarkable emargination of the head behind the mandibles.

Found by Mr. Janson on fungi in Headly Lane, Mickleham, some years ago, and by Mr. Bold in Northumberland. Dr. Power has also captured a single specimen at Headly Lane: this was supposed to be *A. mandibulare*, Sturm, a species of which I have seen no British example, and which must, I am afraid, be (at any rate for the present) erased from our lists.

7. *Agathidium rotundatum*, Gyll.

Black, the sides of the thorax, legs and antennæ pitchy; club of the latter black, with the apex sometimes lighter; head and thorax very finely punctured, the punctuation on the disc of the latter being very obsolete; elytra with a well-marked sutural stria, extending beyond the middle, pretty thickly and finely punctured, the punctures being more evident towards the apex and sides. Of the male there are two well marked forms. In one the left mandible is armed with a straight pointed thorn-like horn reclining on the head. In the second this mandible is merely a little thickened and curved. In both of these forms the anterior and middle tarsi are slightly dilated and there is a small bunch of hairs springing from the metasternum.

Long. $\frac{2}{3}$ lin.

Common in the North of England and Scotland under the bark of fir stumps; the more developed form of the ♂ seems to be rare. The smallest of our British *Agathidia*, small males of *A. marginatum* alone being equally diminutive.

8. *Agathidium convexum*, nov. sp.

Nigrum, nitidum, prothoracis limbo piceo; antennis pedibusque rufis; capite equaliter punctulato; prothoracis disco obsolete,

lateribus cum elytris parce subtiliter punctulatis, his stria suturali medium haud attingente; mesosterno subtiliter carinato.

♂ tarsis anterioribus et intermediis dilatatis; metasterno fasciculo pilorum parvo instructo.

♀ tarsis 5, 4, 4.

Variat colore, interdum piceo-rufum (forte immaturum).

Long. $\frac{3}{4}$—$\frac{4}{5}$ lin.

Closely allied to the preceding, but larger, with a short neatly impressed sutural stria, and the club of the antennæ concolorous. Head finely and pretty closely punctured. Antennæ with the third joint as long as the two succeeding, the club concolorous; thorax scarcely narrower than the elytra, sparingly and obsoletely punctured, the sides more thickly and evidently so. Elytra very convex, sparingly and faintly but evidently punctured, with a short narrow sutural stria not reaching to the middle; humeral angles as in *A. rotundatum*. The male sometimes has the left mandible a little elongated and pointed.

This species is about the size and has very much the appearance of *A. marginatum*, Sturm, but differs from it in the following respects:—The elytra possess a short but evident sutural stria, and their punctuation is less close and distinct, the antennæ are unicolorous, the female has the anterior tarsi five-jointed. From description it also appears to be closely allied to *A. hæmorrhoum*, Erich., but to be larger and with less evident punctuation (especially on the elytra) than that species.

Rare; most of the specimens I have seen come from Scotland, where it has been taken by Mr. Hislop. I have found it at Rannoch in Perthshire; also taken by Dr. Power at Hampstead (on the authority of his specimens *A. piceum* was erroneously introduced into our lists). I have also found one or two other specimens in collections mixed up with *A. marginatum*, Sturm.

9. *Agathidium marginatum*, Sturm.

Black, very convex, with the margins of the thorax and elytra towards the apex more or less pitchy; antennæ and legs pitchy-red, with the first two joints of the club of the former darker; elytra without any sutural stria, pretty thickly and evidently, the head and thorax very finely punctured. ♂ with the anterior and middle tarsi slightly dilated at the base; metasternum with a very small fasciculus of hairs; ♀ with tarsi 4, 4, 4.

Long. $\frac{3}{4}$ lin.

This insect cannot be confounded with *A. lævigatum*, which is the only other British species without any sutural stria; the well marked humeral angles of the elytra (more nearly rectangular than in most of its allies) of *A. marginatum* will at once distinguish it from that species.

Rare; occurs very sparingly both in the North and South. Found once by Mr. F. Smith in some numbers in Charlton pit.

10. *Agathidium nigrinum*, Sturm.

Pitchy black, with the antennæ, except the club, and the legs, a little lighter; head tumid behind the eyes, very closely and extremely finely punctured; thorax very transverse, very closely and obsoletely punctured, not so wide as the elytra; these with their humeral angles nearly right angles, punctuation rather fine and not close, sutural stria well marked and reaching beyond the middle. ♂ with the anterior and middle tarsi a little dilated, and a very minute bunch of hairs on the metasternum.

Long. $1\frac{1}{4}$—$1\frac{1}{2}$ lin.

This fine insect is distinguished from all our other indigenous species, except *A. rhinoceros*, by its head being tumid behind the eyes; this character, together with the well marked nearly rectangular humeral angles of the elytra, at once separates it from *A. atrum*, which is the only other species that ever equals it in size.

Rare; found sometimes in sandpits in the south, at fir stumps in Scotland, and is also taken by Mr. Bold in Northumberland.

11. *Agathidium rhinoceros*, nov. sp.

Globoso-ovatum, nigro-piceum; antennis articulis 4—8 intus subproductis; capite prothoraceque parce punctatis, hoc lateribus antrorsum angustatis; elytris punctulatis, humeris fere rectis; stria suturali medium attingente.

♂ mandibula sinistra vel cornuta, vel producta, vel mutica; tarsis anterioribus et intermediis dilatatis; metasterno fasciculo pilorum inconspicuo instructo.

♀ tarsis 5, 4, 4.

Long. $1\frac{1}{4}$ lin.

Var.—Piceo-rufum.

Pitchy black, with the legs and scape of the antennæ lighter; head with the temples tumid behind the eyes and with two broad shallow foveæ behind the mandibles, together with the thorax

finely punctured, the latter with its sides narrowed anteriorly, though but little rounded; elytra closely and evidently punctured, with the humeral angles nearly right angles.

Allied to *A. nigrinum*, but smaller and narrower, with the elytra more acuminate behind and the punctuation of the upper surface more distinct throughout, but more sparing on the head. Judging from Thomson's description of *A. arcticum*, it must also be closely allied to that species, but in *A. arcticum* the foveæ between the eyes appear to be wanting and the tarsi in the male are not dilated, nor does there appear to be any form of that sex with an armed mandible.

In *A. rhinoceros* the development of the left mandible of the ♂ is more remarkable than in any other species of the genus with which I am acquainted, but it varies extremely and is generally entirely wanting, having the mandible simple, as in the other sex. Sometimes there is a long blunt horn curved backwards and springing from the mandible a little before its apex, while sometimes the mandible itself is prolonged and bent upwards into a horn; there are several distinct varieties of the first-mentioned of these forms, and the second gradually shades off to the unarmed variety.

This species was found by Mr. Bishop and myself in considerable numbers under the bark of a small fir stump at Rannoch in the beginning of August, 1864. I know of no other examples.

With this species I conclude the list of the British *Agathidia*, so far as our collections at present go. There are, however, several other species, some of which at least are likely to occur in this country. Among these may be mentioned *A. badium*, Ziegl., intermediate between *A. lævigatum* and *A. seminulum*, pitchy in colour, with the elytra slightly punctured and with no sutural stria; *A. confusum*, Bris., like *rotundatum*, but with the punctuation of the elytra more marked and with the anterior tarsi in the ♀ only four-jointed; *A. mandibulare*, also like *rotundatum*, but impunctate; *A. arcticum*, Thomson, is also not unlikely to occur in some of the northern parts of Scotland when those districts shall be properly searched.

XXV. *Observations on some remarkable Varieties of* Sterrha sacraria, *Linn., with general Notes on Variation in* Lepidoptera. *By* R. M'Lachlan, F.L.S.

[Read 4th December, 1865.]

At the last Meeting of this Society (see Journal of Proceedings, 6 Nov. 1865, p. 124), I exhibited some bred specimens of *Sterrha sacraria*, showing an extraordinary amount of variation. It has been strongly urged upon me that I should not allow these examples to be distributed without leaving a suitable record of their peculiarities, and I have therefore drawn up the following notes, and have taken advantage of the occasion to make a few remarks on variation in *Lepidoptera* generally, especially in the British species.

With respect to *S. sacraria*, I will first repeat what has been already recorded, viz., that on the 19th of last August, my nephew, Mr. W. J. Wilson, when walking with me in a lane near Worthing in Sussex, captured a damaged female of this insect which immediately commenced depositing eggs; but she laid only seven, and I imagine that she had previously almost exhausted her stock, as her abdomen was thin and collapsed. This female example (Pl. XXIII. fig. 1) differed in nowise from the ordinary typical form and size of the species (expanse of wings 11 lines). The eggs I at once sent off to my friend the Rev. John Hellins, chaplain of the county prison at Exeter, so well known for his success and skill in breeding *Lepidoptera*. One egg unfortunately was destroyed in transit, but the remaining six all hatched on the 29th of the same month. As the larva and its usual food-plants were quite unknown (excepting from an unpublished figure by Herr Carl Plötz of Greifswald, who attaches it to a species of Chamomile), Mr. Hellins, as is his usual custom with all larvæ of *Geometridæ* with whose food he is unacquainted, offered the young larvæ *Polygonum aviculare*, and they at once commenced feeding on that plant, and thrived well. On the 19th of September one larva commenced spinning, and by the 30th of that month all had changed to pupæ. On the 15th of October the first imago, a female, emerged; two other females came out on the 17th, and a fourth on the 19th; this was kept alive with the idea of pairing her, but she died on the 25th, just before the fifth example, a male,

made its appearance; the last pupa likewise produced a male on the 28th; thus about a fortnight elapsed between the appearance of the first and last moths. The larvæ were beautifully figured by Mr. W. Buckler of Emsworth, Hants (a copy of this figure is here given on Pl. XXIII.), and have been most minutely described by Mr. Hellins in the "Entomologists' Monthly Magazine," vol. ii. pp. 134, 166. With respect to the moths produced from these eggs, I can only say that they show an extraordinary amount of variation *inter se*, and bear little resemblance to the parent moth, or to what has been always considered as the typical form of the species, and I have little hesitation in saying that had any one of them been taken at large, it would hardly have been referred to this species. I will describe them *seriatim*.

No. 1. ♂. (Pl. XXIII. fig. 2.) Anterior wings uniformly rosy-grey; the apical cilia rosy-pink; no discal spot; the oblique transverse line blackish, becoming grey on the inner side, and merging into rosy at its junction with the hind margin. Posterior wings pale silky grey, broadly blackish-grey on the costal and apical margins, and with a well-defined central blackish-grey line; cilia whitish-yellow. Head and thorax greyish-ochreous. Legs and antennæ dark fuscous.

Expanse of wings 13½ lines.

No. 2. ♂. (Pl. XXIII. fig. 3.) Anterior wings uniformly greyish-yellow, suffused with rosy; the apical cilia bright rosy, bordered by a narrow yellow line at the base; a small purplish discal spot; costal margin purplish for about a third of its length from the base; oblique transverse line purplish, becoming rosy internally and bordered on each side by an indistinct yellowish space. Posterior wings silky whitish-grey, bordered with darker grey, and with an indistinct dark-grey central cloud; cilia very pale whitish-yellow. Head and thorax pale dirty greyish-yellow. Legs and antennæ dark blackish-fuscous.

Expanse of wings 12 lines.

No. 3. ♀. (Pl. XXIII. fig. 4). Anterior wings smoky-buff; apical cilia bright rosy, with a very narrow yellowish line at the base; a very distinct, but small, blackish discal spot, with an indistinct smoky cloud below it; costal margin purplish-grey at the extreme base; oblique transverse line black, becoming grey internally. Posterior wings silky whitish; the veins grey, especially at their terminations on the costal margin. Head and thorax dirty greyish-yellow. Legs and antennæ dark blackish-fuscous.

Expanse of wings 13 lines.

No. 4. ♀. (Pl. XXIII. fig. 5.) Anterior wings greyish-ochreous; apical cilia pale rosy, with a distinct pale yellow line at the base; discal spot distinct, elongate and blackish, with a purplish-grey cloud below it, more towards the base; costal margin purplish-grey for about a third of its length from the base; oblique transverse line blackish externally, purplish internally, slightly and indistinctly margined with yellowish. Posterior wings pale silky whitish, with an indication of a broad greyish central band. Head and thorax concolorous with the anterior wings. Legs and antennæ fuscous.

Expanse of wings 12 lines.

No. 5. ♀. (Pl. XXIII. fig. 6.) Anterior wings uniformly pale buff; apical cilia paler; a very distinct small black discal spot, with a slight indication of a greyish blotch below it; costal margin greyish at the extreme base; oblique transverse line deep black, paler internally. Posterior wings silky whitish, slightly greyish at the costal portion of the apical margin, and in the centre. Head and thorax concolorous with the anterior wings. Legs and antennæ fuscous.

Expanse of wings 13½ lines.

No. 6. ♀. (Pl. XXIII. fig. 7.) Anterior wings pale yellow, the spaces between the veins filled in with rosy-pink, hence the veins appear conspicuously yellow, with the rose colour predominating on the ground; cilia bright rosy, with a narrow yellow line at the base; discal spot small and blackish; costal margin rosy for about one-half of its length from the base; oblique transverse line very broad, narrowly blackish externally, and broadly rosy internally. Posterior wings silky whitish, with a broad and well-defined central grey band. Head, collar and petagia greyish-yellow, the thorax rosy-grey in the middle. Legs and antennæ pale fuscous.

Expanse of wings 12 lines.

This specimen, though it is apparently the most curious of all, in reality more nearly approaches a recognized form, figured by Esper (Die Schmetterlinge, pl. xxx. fig. 10, 11), under the name of *sanguinaria*, and which has been justly considered as a variety of *sacraria* by modern authors.

With respect to the geographical distribution of the species, I may say that it is found over almost all the warmer portions of the old world. Linnæus described it from an example from Barbary (Systema Naturæ, ed. 12, p. 863, 220), and it has been received from all parts of the African continent, from Algiers to the Cape; in India and Asia Minor it is not uncommon, but I am not sure

that it has been observed in Australia. In Europe it is common in the South, chiefly in the autumn months, and Mr. G. F. Mathew has recorded ("Weekly Entomologist," vol. ii. p. 83), that in October at Lisbon and Gibraltar it was the most common Lepidopterous insect. Duponchel, however, mentions June as the time of its appearance, and says "Elle se tient suspendue à l'extrémité des tiges de gramen dans l'état de repose" ("Lépidoptères de France," tom. viii. pl. 178, fig. 7). In Sweden it was recorded as long since as 1784 by Thunberg (Dissert. Ent. Insect. Suecica, pt. 1, p. 14), but I am uncertain if it has since been observed there; indeed Herrich-Schäffer (Schmett. von Europ.) doubts the correctness of Thunberg's observation, but the latter's description and remark, "*Pyralis sacralis*—magnitudine et facie omnino *P. forficalis*," can surely leave no uncertainty on this point. In England it has only been observed in the south and was unknown until 1857. Since then about twenty specimens have been taken, all in the autumn, and often at gas-lamps; the year 1865 has produced at least half of the native examples. It has not been observed further north than London, but several have been found in the suburbs of the metropolis. Thus Africa may be considered its head-quarters, and it is almost invariably found in boxes of insects from thence.

The position of the insect in repose has been remarked by several writers, and is in itself sufficient to separate *Sterrha* from *Aspilates*, in which latter genus *sacraria* was at one time placed. It would seem to rest head downwards, after the manner of a *Crambus*, with its wings crossed at a very acute angle, and in this respect it has been compared by Zeller (Isis, 1847, p. 492) to the well-known *Cilix spinula*, and Hellins (Ent. Mo. Mag. vol. ii. p. 135) also makes the same comparison, without being aware of Zeller's observation.

We have yet almost everything to learn of the habits of the creature. Are there two broods or only one brood in the year? Does it hibernate in the imago state? For my part I shall not be surprised if it prove to be only single-brooded, the imago hibernating and not appearing after hibernation until the summer is well advanced.

I now come to the subject of the recorded variability of the species. The figures given by Esper, Duponchel, Freyer, &c., vary little, and Guenée (Phalénites, vol. ii. p. 175) says, "Elle se retrouve, sans autre différence que le bord terminal un peu plus droit, en Algérie, dans l'Afrique centrale, en Abyssinie, et dans le nord de l'Inde." I have examined thirty-two examples in the collection of the British Museum, chiefly from Africa and India,

and they are remarkably constant, save that two females from South Africa pertain to the form known as *sanguinaria*. Zeller ("Isis," 1847, p. 491) gives the fullest information on this point; he indicates seven forms (including the type), chiefly differing in the presence or absence of a discal point, in the colour of the transverse fascia, and (slightly) in the ground-colour.

The great amount of variation exhibited in these English bred examples opens up the question of the right that the so-called species of *Sterrha*, allied to *S. sacraria*, have to be considered as distinct. *S. sanguinaria*, Esper, has already been disposed of as a variety of *sacraria*. There then remain—

(1.) *S. Labdaria*, Cramer (Papil. Exot. pl. 181, D.), from Surinam; now known only from the figure, which extremely resembles *S. sacraria;* the only instance, supposing the locality to be correct, of a *Sterrha* occurring on the American continent.

(2.) *S. anthophilaria*, Hübner, from South Russia; with the anterior wings of the typical *sacraria*, and with the posterior wings blackish, with a central pale band.

(3.) *S. roscaria*, Treitschke (Schmett. von Europa, vol. vi. pt. 2, p. 298), from the Ionian Islands and South Russia, figured by Duponchel (pl. 178, fig. 8), and by Herrich-Schäffer (*anthophilaria*, fig. 29); differing from the typical *sacraria* slightly in the form of the wings, with the colour of the anterior entirely rosy-grey, and with the posterior wings of *anthophilaria* (much resembling the hereinbefore described No. 1); given by Eversmann as a variety of *sacraria*, and by Staudinger ("Catalog Lepidopteren Europas," p. 76) as perhaps a variety of the female of *anthophilaria*.

(4.) *S. plectraria*, Guenée (Phalénites, t. ii. p. 176, pl. viii. fig. 7), from Abyssinia; differing from *sacraria* by its larger size, more triangular wings, and different coloration.

(5.) *S. participata*, Walker (Brit. Mus. Cat. Lep. pt. xxiii. p. 1060, 7), from Namaqua Land; with reddish anterior wings, and a dark purplish-red broad oblique band, white discal spot, and pinkish-purple apical cilia.

(6.) *S. peculiata*, Walker (*loc. cit.* 8), from Natal; with reddish-ochreous anterior wings, and a pale discal spot.

S. florilegaria, Zeller, Guenée, from Caffraria, I put out of the question, because Guenée states that, despite its resemblance to *S. sacraria*, he is uncertain if it really pertains to the genus.

After examining the six English specimens, bred from the same brood of eggs, I can come to no other conclusion than that all

these supposed species should probably be referred to *Sterrha sacraria*, for most of them really approach more nearly to the typical form of that species than do most of the bred examples.*

I deeply regret that Mr. Hellins was unable to obtain eggs from these examples, so as to prove if they would continue to vary in like manner, or would all or in part revert to the typical form, for I cannot but consider it a very extraordinary circumstance that not one of them should have in any degree approached to this form. To what are we to attribute this variation? I ask the question, but confess that I see no satisfactory method of answering it. "Unusual food-plant" will no doubt be suggested by some. I cannot admit this explanation, because I have no belief in the power of the food of the larva to produce any immediate and striking effect upon the imago; such an effect must be the work of ages, combined with previous isolation; besides as *S. sacraria* is almost cosmopolitan, even the typical form, it is reasonable to suppose, is by no means confined to any one plant. I rather look to climate, but here again I do not understand the immediate effect. It may be worth remarking that these examples show precisely the peculiarities that one would expect in a delicate tropical or semi-tropical species adapting itself to a colder climate, for their texture is denser, and their general form more robust.

I will now make a few general remarks on variation in *Lepidoptera*, chiefly based upon observations of British species. Britain has been emphatically styled by Guenée "le pays des variétés," and it is well known that British specimens are always desired by continental collectors. Indeed I could not help remarking, when looking over some of the Parisian collections, on the absence from or rarity in them of what we are wont to consider as the typical forms of many species. This great richness in varieties may be due, first, to our insular position; secondly, to our anomalous and variable climate; and thirdly, and perhaps chiefly, to the diversity in the geological structure of these islands. I, of course, place out of the question sexual variation, and also the so-called cases of "hermaphroditism" or "gynandromorphism,"

* This suggestion is of course based on incomplete evidence; for should the larvæ of these forms prove to be constantly distinct from each other and from that of *S. sacraria*, that would establish the right of all or any of them to be considered as species. I may add that, through the kindness of Mr. Doubleday, I have examined specimens of *anthophilaria* received from Dr. Staudinger; these differ from any variety of *sacraria* that I have seen in the direction of the oblique fascia, which leaves the costa before the apex, whereas in *sacraria* it leaves the costa at its junction with the apical margin.

considering these latter more in the light of monstrosities; also those cases which must come under the head of accidental variation; likewise variation in the broods of species that have two generations in the year. In this country the species of the genus *Selenia* are familiar examples of the latter, and a more remarkable one is found on the continent in the case of *Vanessa Prorsa*. Local variability is therefore the chief head under which to class variation in the imago.

Many species become more or less "melanised" when occurring in the North of England and Scotland, the darkening becoming more marked the further we proceed northwards. Among these may be cited, *Spilosoma fuliginosa*, *S. mendica* (♂), *Liparis monacha*, *Crocallis elinguaria*, *Hypsipetes elutata*, *Melanthia rubiginata*, *Cidaria testata*, *C. populata*, *C. suffumata*, *Notodonta dromedarius*, *Ceropacha flavicornis*, *C. or*, *C. duplaris*, *Acronycta rumicis*, *Xylophasia rurea*, *X. polyodon*, *Luperina testacea*, *Celæna Haworthii*, *Rusina tenebrosa*, many species of *Agrotis*, *Noctua festiva*, *N. neglecta*, *Trachæa piniperda*, *Tæniocampa gothica*, *T. leucographa*, *T. miniosa*, *Orthosia lota*, all the genus *Dianthœcia*, *Polia chi*, *Aplecta nebulosa*, *A. tincta*, *A. occulta*, *Hadena adusta*, *H. dentina*, *Calocampa vetusta*, together with many species of *Tortrices* and *Tineina*. On the contrary there are a few species which become paler the further we proceed north. As instances of this I may cite *Fidonia piniaria*, in the male of which those portions of the wing which are rich yellow in southern examples, become white in northern ones; and *Cidaria corylata*, in which, in northern examples, the ochreous bands entirely disappear, and the black markings are much less extensive, being frequently broken up into grey spots. Another instance may be cited in which locality actually changes and confuses the normal sexual variation in the colour; I allude to *Hepialus humuli*, in which the sexual characters in the coloration are generally so well marked, but in the Shetland Islands a form of this species is found with the male frequently coloured as in the female. Variation tending towards melanism, but of a peculiarly smoky character, is found in many species from the northern districts of England, especially the country about Warrington (but disappears again still further north), and this district would appear to be peculiarly adapted to the production of varieties. I may mention *Epunda viminalis*, *Amphidasys betularia*, *Hypsipetes impluviata*, *Tephrosia biundularia*, and *Cidaria russata*, as instances in which this smoky form predominates in that locality; and Mr. Doubleday remarks that aberrations of *Arctia caja*, *Spilosoma menthastri*, and *Abraxas grossulariata*, are much more

frequent there than in other parts. It appears to me then not difficult to imagine that should this district suddenly become isolated, these forms would of necessity develope into what we should very fairly call species. Many North American insects are very similar to ours; some of these are considered identical, others possessing rather wider differences are called distinct species; surely here is a very clear case of "developmental" handywork. Again, to slightly diverge from the subject of British *Lepidoptera*, I would add that a very slight acquaintance with exotic *Rhopalocera* has convinced me of the probability of the developmental theory, for we find there the greatest difficulty in distinguishing between what are to be considered as species and what as varieties, because differences of locality produce forms which, though closely allied, present certain minor differential characters; no doubt these are rightly termed "species," but still we cannot doubt their common origin. In Europe the genus *Erebia* is an instance of this, and precisely the one in which we should expect to find such a result, because as these insects appear to require a certain low average temperature, they naturally are chiefly found in mountain districts, which from upheaval, or from sinking of the surrounding country, have become isolated, and present the most favourable conditions for gradual development. To return to my subject, I may say that there are some few British species which present dimorphic forms of the female only, as in the familiar instances of *Colias Edusa* and *Argynnis paphia*. Others again present almost endless variation, without regard to locality, such as most of the species of the genus *Miana*, several *Geometridæ*, the genus *Peronea*, &c. In another British insect there exist two forms, which though I think without doubt of common origin, are yet entitled to rank as distinct,—I allude to *Lasiocampa quercus*, which on the northern moors, and in some similar isolated positions in the south, presents the form known as *L. callunæ*, which differs remarkably in habit from *L. quercus*, and in which the larva differs slightly, correlated with still smaller differences in the imago. *Metrocampa margaritaria*, which is double-brooded in the south of England, has only one brood in Scotland, and I believe there are other analogous instances; it is also well known to all Scotch Lepidopterists that many species habitually remain there in the pupa state for two, three or four years, although in the south this would form quite the exception in the same species; this retardation of development may probably have some effect in causing variation, according to the observations of M. Bellier de la Chavignerie.

I now come to consider variation in the larval condition. I have been kindly favoured by Messrs. Hellins and Buckler (than

whom none are more competent to speak on the subject) with the following table, which I reproduce *in extenso*:—

Species.	Food-plant.	Variation of Larva.	Notes on Imago. C.—constant.
Vanessa Atalanta.	*Urtica dioica.*	Various shades of ground-tint.	C.
V. cardui.	*Carduus.*	Various shades of ground tint; lines more or less distinct and bright.	Rather variable in tints.
Arge Galathea.	*Graminaceæ.*	Ochreous or green.	C.
Thecla quercus.	*Quercus.*	Various shades of warm brown; greenish.	C.
Smerinthus populi.	*Populus; Salix.*	One or two tints of green ground colour; sometimes more or less blotched with red.	Variable in tint of ground-colour.
Acherontia Atropos	*Solanum tuberosum.*	Brown or yellowish.	C.
Sphinx convolvuli.	*Convolvulus; Impatiens,* &c.	Green or brown, &c.	C.
Chærocampa elpenor.	*Epilobium; Vitis; Fuchsia,* &c.	Green; brown.	C.
Macroglossa stellatarum.	*Galium,* various species.	Green; lead-colour; olive-brown.	C.
Zygæna filipendulæ.	*Lotus corniculatus,* &c.	Green; yellowish-green.	C.
Orgyia pudibunda.	Polyphagous.	Green; yellow; brown; white? &c.	C.
Trichiura cratægi.	*Prunus spinosus; Salix; Cratægus,* &c.	Brown; white; black; red spots, &c.	C.
Pœcilocampa populi.	*Populus; Quercus; Salix; Prunus; Betula.* &c.	Brown; blue; grey, &c.	C.
Saturnia carpini.	*Calluna; Salix; Rubus,* &c.	Spots yellow or pink.	C.
Rumia cratægata.	*Prunus spinosus; Cratægus,* &c.	Green, red spots; brown-grey, green spots, &c.	C.
Odontopera bidentata.	*Fraxinus; Hedera Helix,* &c.	Grey; brown; white; green.	Tolerably constant.
Crocallis elinguaria.	*Salix; Prunus; Cratægus,* &c.	Brown; grey; greenish; ochreous, &c.	Tolerably constant.
Ennomos fuscantaria.	*Quercus; Ligustrum vulgare.*	Green; brownish-grey, &c.	C.
E. angularia.	*Quercus; Fagus?*	Brownish; green; (sometimes smooth).	Rather variable.
Biston hirtarius.	*Salix; Quercus,* &c., &c.	Dark brown; greyish-brown; slaty.	C.
Amphidasys betularia.	.. ..	Greenish; grey; brown, &c.	Permanent varieties.
Boarmia repandata.	*Salix; Rubus; Cratægus;* low plants.	Grey; whitish-ochreous, &c.	Variable.
B. rhomboidata.	*Ligustrum; Hedera; Cratægus; Ulmus; Spartium; Vitis; Trifolium; Clematis,* &c.	Warm brown; reddish; dirty white, with black markings, &c.	Variable.
Tephrosia biundularia.	*Larix* and ?	Reddish; blackish; ochreous-grey.	Variable.

Species.	Food-plant.	Variation of Larva.	Notes on Imago. C.—constant.
Gnophos obscurata.	*Cistus; Sanguisorba; Potentilla*, &c.	Greyish; ochreous; blackish.	Variable.
Hemithea thymiaria.	*Quercus*; also low plants.	Green; reddish.	C.
Halia wavaria.	*Ribes.*	Green; purplish-brown.	C.
Macaria notata.	*Salix; Betula.*	Yellowish-green; brownish-green; brown; purplish, &c.	C.
M. liturata.	*Pinus.*	Green; smoky, &c.	C.
Fidonia atomaria.	*Calluna* and *Erica.*	Pale green; grey; ochreous; brown; pinkish-red.	Variable.
Ligdia adustata.	*Evonymus europæus.*	Bright green; pale brown.	C.
Hybernia rupicapraria.	*Prunus; Cratægus; Calluna; Ribes*, &c.	Pale green; blue-green; smoky.	C.
H. leucophæaria.	*Quercus.*	Whitish; pale green; olive-green; brownish.	Variable.
H. progemmaria.	*Quercus; Betula; Ulmus; Prunus*, &c.	Pale buff; blue-green; smoky.	Tolerably constant.
Cheimatobia brumata.	*Quercus; Pomus; Cratægus*, &c. &c.	Pale greenish-grey; various shades of green.	C.
Oporabia dilutata.	*Prunus; Acer; Castaneus; Betula; Quercus; Laurus*, &c.	Green; green, covered with red markings.	Variable.
Larentia cæsiata.	*Vaccinium vitis-idæa.*	Full green; rich red.	Mostly constant.
L. pectinitaria.	*Galium.*	Deep brown; grey, &c.	C.
Emmelesia decoloraria.	Seed vessels of *Lychnis.*	More or less green.	C.
E. alchemillata.	*Galeopsis tetrahit.*	Red or brown.	C.
Eupithecia linariata.	Flowers and seeds of *Linaria.*	Yellow; green; brown.	C.
E. pulchellata.	Flowers and seeds of *Digitalis.*	Pale green; green; smoky.	C.
E. centaureata.	Flowers of *Senecio; Solidago; Clematis; Saxifraga; Reseda*, &c. &c.	Whitish-green; full-green; yellow; buff; with red, purple, blackish or green markings.	C.
E. satyrata.	Flowers of low plants.	Green; puce; brown or red markings.	Rather variable.
E. castigata.	On any plant.	Different shades of brown and grey.	Scarcely variable.
E. virgaureata.	Flowers of *Solidago* and *Senecio.*	Red-brown; darker-brown.	C.
E. tripunctata.	Flowers of *Angelica.*	Pale-green; full-green; olive-brown; deep brown.	C.
E. fraxinata.	*Fraxinus.*	Full-green; yellow-green; puce; uniform or with rich pattern.	C.

Species.	Food-plant.	Variation of Larva.	Notes on Imago. C.—constant.
Eupithecia vulgata.	*Cratægus;* also various flowers.	Red-brown; olive; blackish, &c.	C.
E. expallidata.	Flowers of *Solidago.*	Yellow; yellow-green; full green; uniform or richly marked.	C.
E. absinthiata.	Flowers of *Senecio; Achillæa; Artemisia; Agrimonia; Centaurea,* &c. &c.	Yellow-green; olive; puce; brown; with pink, blackish, brown, or green markings.	C.
E. minutata.	*Calluna vulgaris.*	Greenish; rosy-pink.	C.
E. assimilata.	*Ribes nigrum; Humulus.*	Green; pink; purplish.	C.
E. nanata.	*Calluna vulgaris.*	Rose-pink; olive; white; green; yellow, &c.	Mostly constant.
E. dodoneata.	*Quercus.*	Olive-green; red-brown.	C.
E. lariciata.	*Pinus larix.*	Full green; puce; brown.	C.
E. exiguata.	*Cornus; Cratægus.*	Full green; puce.	C.
E. sobrinata.	*Juniperus communis.*	Green; olive; light-red; uniform, or with red or brown pattern or lines.	Variable.
E. pumilata.	*Clematis; Scabiosa; Agrimonia; Senecio; Potentilla; Spartium,* &c.	Whitish; pinkish; yellow; brown; purple; uniform or with markings.	Mostly constant.
E. coronata.	Flowers of *Clematis.*	Various shades of green, olive and brown.	C.
Hypsipetes elutata.	*Salix caprea.*	Various shades of brown.	Very variable.
Melanippe rivata.	*Galium.*	Green, with brown or reddish markings.	C.
M. subtristata.	*Galium.*	Brown, &c.	C.
M. galiata.	*Galium.*	Pale ochreous; dark brown; variable markings.	C.
M. fluctuata.	Low plants.	Brown; green; uniform or with markings.	Variable.
Anticlea badiata.	*Rosa canina.*	Pale green; purplish-red.	Rather variable.
A. berberata.	*Berberis.*	Ochreous; purplish-red.	C.
Chesias spartiata.	*Spartium scoparium.*	Dark green; yellow, &c.	C.
Camptogramma fluviata.	Low plants.	Yellowish-green; greenish brown; reddish-brown.	Variable.
Scotosia rhamnata.	*Rhamnus catharticus.*	Green; black and yellow.	C.
Cidaria russata.	Polyphagous.	Green; yellowish-green; with or without purple red line.	Variable.

Species.	Food-plant.	Variation of Larva.	Notes on Imago. C.—constant.
Cidaria silaceata.	*Epilobium.*	Green; pinkish-green.	Variable.
C. prunata.	*Ribes rubrum* and *grossularium.*	Brown; grey; pale green.	C.
C. populata.	*Vaccinium vitis-idæa.*	Brown; reddish-green, &c.	Mostly constant.
Notodonta camelina.	*Quercus; Fagus; Corylus.*	Green; lilac; reddish.	C.
N. dictæa.	*Salix caprea*, &c.	Green; brown.	C.
N. dictæoides.	*Betula.*	Green; purple.	C.
Xylophasia rurea.	*Graminaceæ.*	Various tints of ochreous, reddish, and dark brown.	Variable.
Mamestra brassicæ.	Polyphagous.	Green; grey; brown.	C.
Gortyna flavago.	In stems of *Cnicus; Arctia; Verbascum; Digitalis*, &c.	Purplish-grey; yellowish flesh-colour.	C.
Rusina tenebrosa.	Low plants.	Rich red; reddish-brown; brown.	C.
Grammesia trilinea.	*Plantago.*	Dark grey; ochreous.	Rather variable.
Agrotis porphyrea.	*Calluna* and *Erica.*	Dark green; buff; red.	C.
Triphæna orbona.	Polyphagous.	Many tints of grey and brown.	Variable.
T. pronuba.	Roots of *Graminaceæ*, &c.	Green; olive-green; various shades of brown.	Variable.
Noctua plecta.	Low plants.	Various shades of brown; ochreous; green.	C.
N. C-nigrum.	Low plants.	Grey; brown.	C.
N. ditrapezium.	Various.	Various tints of ochreous, red and brown.	C.
N. triangulum.	Various.	Various tints of ochreous, red and brown.	C.
N. neglecta.	*Erica* and *Salix caprea.*	Orange; brown; green.	Variable.
N. xanthographa.	*Graminaceæ*, &c.	Many tints of buff and brown.	Variable.
Tæniocampa gracilis.	*Salix; Rubus.*	Green; red-brown.	Rather variable.
T. cruda.	Chiefly *Quercus.*	Green; black; brown; puce.	Mostly constant.
Dianthœcia carpophaga.	Seeds of *Silene inflata.*	Many tints of buff and ochreous.	Variable.
D. capsincola.	Seeds of *Silene* and *Lychnis.*	Buff; brownish; greenish.	C.
Epunda lichenea.	*Senecio vulgaris*, &c.	Brown; green; grey.	C.
Phlogophora meticulosa.	Polyphagous.	Green; brown; ochreous.	C.
Hadena chenopodii.	*Chenopodium* and *Atriplex.*	Green; brown; with or without red lines.	C.
H. contigua.	*Salix.*	Green; bright red.	C.
H. oleracea.	Low plants.	Green; brown.	C.

Species.	Food-plant.	Variation of Larva.	Notes on Imago. C.—constant.
Hadena pisi.	*Erica; Spartium; Salix; Pteris,* &c.; perhaps polyphagous.	Dark-green; crimson.	Rather variable.
Cucullia chamomillæ.	*Anthemis.*	Pink; green; yellow.	C.
C. lychnitis.	*Verbascum nigrum* and *lychnitis.*	Green; yellow.	C.
Heliothis marginata.	*Ononis; Betula.*	Green; red; smoky.	C.
H. peltigera.	*Hyoscyamus; Ononis.*	Green; red; uniform or with pattern.	C.
Stilbia anomala.	*Graminaceæ.*	Green; brown.	C.

Mr. Hellins then adds a list of species which, though very variable in the imago state, are constant or nearly constant in the larval. Among these may be cited *Arctia caja*, *Hadena protea*, *Tæniocampa instabilis*, *Anchoscelis lunosa*, *Apamea oculea*, &c.

A glance at the foregoing table will show that often when the imago is most constant, the larva shows the greatest tendency to variation; this is especially marked in the species of the genus *Eupithecia*. To what then are we to attribute this variability in the larva? I have before expressed my doubt as to the effect of food in causing variation in the imago; not so, however, in the larva, for I believe that variability in the latter is caused in a great measure, but indirectly, by food, and that the object of such variation is, as Mr. Hellins has justly surmised in his letters to me, mimicry. Not that the larva of one species mimics that of another, but rather the plant on which it subsists. In fact the prevailing colours of the majority of Lepidopterous larvæ are green and brown, and admirably assimilate to those of the foliage and stems of plants and shrubs. This is especially noticeable in the majority of the larvæ of *Geometridæ*, which are not strictly nocturnal feeders as are most of the *Noctuæ*, which retire to some place of concealment during the day, when they would be the most liable to the attacks of birds. The larvæ of many species of the genus *Eupithecia* show this power of mimicry to very great advantage. These are, for the most part, flower feeders, and have evidently the power of assuming the same colour as that of the flowers on which they feed. Some five years since I, one autumn, collected about a hundred larvæ of *Eupithecia absinthiata*, and I remarked that when found on *Senecio Jacobæa*, they

were yellowish, when on *Centaurea nigra* reddish, when on *Matricaria* whitish, &c.; afterwards I placed them all on *Senecio Jacobæa*, they being then nearly full grown. I did not find that they showed a tendency to become yellowish ; and this proved to my mind, first, that it was necessary for the larva to have fed on the one kind of flower from the egg in order to acquire this power of mimicry, and secondly, that the colour of the larva could not be caused by the food showing through the somewhat transparent integuments. Hence, it appears that the colours of Lepidopterous larvæ are in a great measure adapted to save them from being carried off by birds and other enemies, and it is reasonable to suppose that in those cases, where the colours do not assimilate with, or are directly opposed to, those of the food-plant, some other circumstances may exist, rendering such mimicry unnecessary. The larvæ of most internal feeders, which are not greatly exposed to external enemies, show little variation, either in particular species or as a whole.

I conclude, therefore, that food has an immediate though indirect effect in producing variation in the larva, but that in the imago it possesses this attribute in a very small degree. In the latter we must look to other and more subtle causes. That mimicry does not exist in the imago to the same extent as in the larva appears evident, but I cannot believe that Nature is ever aimlessly prodigal, and, no doubt, the causes of variability in the imago-state are as potent as in the larva-state, but at present they are, for the most part, beyond our comprehension.

With respect to range of variation I will say but little. It appears to me that ordinarily varieties have a tendency to revert to what we consider as the type, but that under certain circumstances, not only will they not so revert, but that the divergence will gradually become wider, until eventually they develope into what is considered as a species. I do not say that I am prepared to accept the "development theory" to the full extent to which some would apply it; but that it is a reasonable way of accounting for phenomena, which otherwise cannot be satisfactorily settled, must, I think, be evident to all who endeavour to rid themselves of hereditary prejudices. The acceptation, partial or entire, of this theory is not so disastrous as some would appear to consider it. The most inveterate describer of new species need not fear that the darling object of his existence is useless and aimless if well done, for the process of development is of necessity so immeasurably slow, that to all intents and purposes, a faithful description of a new "form" or "species" is as useful

to a naturalist holding the one view as to another who prefers to adhere to old ideas; it is only that the one looks upon the origin of that species in a different light from the other.

I must ask my readers to bear with me for one moment whilst I diverge from the *Lepidoptera* to refer to another Order to which I have paid more particular attention—the *Neuroptera*. It is a fact that cannot be too strongly insisted upon, that in this Order, the secondary or auxiliary sexual appendages present almost infallible characters for the separation of species. Were these characters perfectly infallible, were there not some forms in a transitional or variable condition, this would, I consider, be fatal to the "development" theory, but such forms or species do exist, and, for instances, I refer to De Selys Longchamps and Hagen's "Monographie des Gomphines," in which it is shown that in two species at least, *Gomphus* (*Onycogomphus*) *forcipatus* (pp. 28-40, pl. ii.) and *Cordulegaster annulatus* (pp. 333-337, pl. xvii.), the anal appendices present rather remarkable variations in form according to locality, and, perhaps, correlated with certain differences in coloration. I have no doubt that other instances could be cited, and I believe that even in the *Trichoptera* parallel cases may be found.

In bringing these notes to a close I must glance at a very elaborate paper "On phytophagic Varieties and phytophagic Species," by Mr. Benj. D. Walsh, of Rock Island, Illinois (a writer thoroughly imbued with Darwinian views), published in the Proceedings of the Entomological Society of Philadelphia, vol. iii. pp. 403-430. In this paper he classes variation by food under twelve different heads (pp. 427-428), which are too lengthy to reproduce here. So far as I understand him, Mr. Walsh is also opposed to the notion of food being an immediate cause of variation in the imago, but he argues that in some insects there are certain more or less constant forms attached to particular plants, and as a rule breeding only *inter se*, which are very closely allied, and which he considers as only phytophagic species, but, nevertheless, quite worthy to be considered and named as distinct. Under this rule would come many of the British species of Micro-Lepidoptera,* and I fancy that had Mr. Walsh been extensively ac-

* In the genera *Gelechia, Elachista, Lithocolletis, Nepticula*, &c., there are certain groups of closely-allied species, each of which apparently feeds exclusively on different species of the same family of plants. In *Lithocolletis* this is especially noticeable in the group of species (*L. pomifoliella* and its allies) attached to the fruit-bearing *Rosaceæ*. On the contrary, we often see totally distinct species of one genus living side by side in the same leaf. I wish to

quainted with the American species of this group, he would have laid more stress on it to illustrate his views.

In taking leave of this subject, I tender my sincere thanks to Mr. Hellins and Mr. Buckler for their kindness in assisting me with notes.

be distinctly understood that I am directly opposed to the view held by some Entomologists, that these cognate forms are immediately occasioned by the difference of the food-plant, though they may have *originated* from that cause, and are thus what Mr. Walsh terms "phytophagic species."

EXPLANATION OF PLATE XXIII.

Fig. 1. *Sterrha sacraria*, ♀; the parent of the following:—

1*a*. Larvæ of *S. sacraria*; on *Polygonum aviculare*.

2—7. Varieties of *S. sacraria*, bred from eggs laid by fig. 1. [Unfortunately, Art has failed to re-produce the beauty of Nature.]

XXVI. *Description of* Papilio Godeffroyi, *n. sp.* *By* Georg Semper.

[Read 4th December, 1865.]

Papilio Godeffroyi.

(Plate XXIV. fig. 1, ♂ ; fig. 2, ♀).

Pap. alis caudatis ; ♂ nigro-fuscis ; anticis striga apicali albido-sulphurea ; posticis supra fascia virescenti-flavida, subtus lunulis septem cœruleis, maculisque submarginalibus rufescentibus ; ♀ fuscis, fascia anticis albido-sulphurea, posticis virescenti-flavida, subtus omnibus alba, lunulis septem cœruleis, alterisque submarginalibus rufis.

Exp. al. ♂ 98^{mm}, ♀ ♀ 99^{mm} et 116^{mm}.

Hab. Upolu, Samoa Islands.

Male.—Upperside glossy black ; *fore-wing* with a short curved band of six yellowish spots near the apex, and irrorated with some yellowish atoms in the discoidal cell and along the exterior margin ; *hind-wing* tailed, with a transverse outwardly-sinuated yellowish-green fascia, irrorated with black atoms, and connected at the anal angle with an ill-defined red-brown lunule ; the space between the sinuous band and the exterior margin is irrorated with some bluish atoms. *Underside* black ; *fore-wing* having the curved band paler and irrorated near the posterior angle with bluish-white atoms ; *hind-wing* with a fascia of seven lunules of bluish atoms, and a series of seven pale rufous lunules parallel to the exterior margin, the one at the anal angle touching the bluish fascia ; *indentations* on the upperside pale-yellowish, on the underside white.

Female.—Upperside dark-brown ; *fore-wing* with a transverse fascia of yellowish spots from the anterior to the posterior margin, the six first like those of the male, but larger, the other five parallel to the exterior margin ; irrorated along the exterior margin and in the discoidal cell with yellowish atoms ; *hind-wing* tailed, with a transverse outwardly-sinuated yellowish-green fascia, margined outwardly by a series of seven lunules of bluish atoms, the fifth and sixth from the anterior margin being larger than the others ; near the exterior margin is a series of seven red lunules, the first and second from the anterior margin being indicated only by some

red atoms; the one at the anal angle touching the seventh bluish lunule. *Underside* dark brown; *fore-wing* as above, except the colour, the fascia and irrorations being white; *hind-wing* with a small transverse fascia of whitish spots, margined outwardly by a series of seven bluish lunules; with seven red lunules disposed as on the upperside, but larger; *indentations* on both sides white.

In the collections of M. Godeffroy and Geo. Semper.

Recently discovered by Dr. Greffe, by whom three specimens have been sent to M. Godeffroy, to whom I have dedicated this beautiful species in acknowledgment of his great zeal for the advancement of science, especially through the exploration of the Pacific Islands.

EXPLANATION OF PLATE XXIV.

Fig. 1. *Papilio Godeffroyi*, ♂, upper and under side.
2. „ „ ♀, „ „

XXVII. *New Genera and Species of* Gallerucidæ. *By* J. S. Baly, F.L.S.

[Read 6th Nov. 1865, 5th Feb. 1866.]

Genus Syphaxia.

Corpus robustum, ovatum, postice paullo ampliatum, valde convexum, sericeo-pubescens. *Caput* modice exsertum, *facie* perpendiculari; *antennis* corporis dimidio æqualibus, robustis, vix fusiformibus, articulis cylindricis, primo a basi ad apicem incrassato, curvato, secundo brevi, tertio quam primo longiori, quarto quam tertio paullo breviori, cæteris ad apicem brevioribus et inter se fere æqualibus. *Thorax* transversus, transversim excavatus. *Elytra* ovalia, confuse punctata. *Pedes* robusti; *coxis* anticis erectis, contiguis; *femoribus* posticis non incrassatis; *tibiis* omnibus apice muticis; *tarsorum* posticorum articulo basali duobus sequentibus conjunctis vix breviori; *unguiculis* muticis, basi incrassatis. *Prosternum* fere obsoletum.

Type, *Syphaxia* (*Monocesta*) *spectanda*, Clark.

Syphaxia may be known from *Monocesta* by its unarmed unguiculi and its much shorter antennæ; and the body is shorter and more convex, as well as more regularly ovate, than in the majority of the species of *Monocesta*.

Sp. 1. *Syphaxia spectanda*, Clark.

Monocesta spectanda, Clark, Ann. & Mag. Nat. Hist. 1865, p. 315.

In the Rev. H. Clark's specimens, the antennæ are wanting; in the specimen before me (which also came from Cayenne) the antennæ are nigro-fuscous, with the exception of the bases of the four lower joints, which are flavous.

Genus Chorina.

Corpus elongatum, parallelum, convexum, sericeo-pubescens. *Caput* exsertum, *facie* perpendiculari; *antennis* modice robustis, corporis longitudine brevioribus, filiformibus, apicem versus vix incrassatis, articulis cylindricis, primo a basi ad apicem incrassato, curvato, secundo brevi, tertio elongato, quatuor sequentibus longitudine perparum decrescentibus.

Thorax transversus, lateribus medio angulatis, disco transversim depresso. *Elytra* thorace paullo latiora, parallela, subcylindrica, confuse punctata. *Pedes* subelongati, robusti; *coxis* anticis erectis, contiguis; *femoribus* posticis non incrassatis; *tibiis* omnibus apice muticis; *tarsorum* posticorum articulo basali duobus sequentibus longitudine æquali; *unguiculis* muticis, basi incrassatis. *Prosternum* fere obsoletum.

Type, *Chorina* (*Monocesta*) *cincta*, Clark.

Chorina may be distinguished from *Syphaxia* by the longer and rather more slender antennæ and by its parallel body; from *Monocesta* (in which genus the two species have been placed by Mr. Clark) the simple unguiculi at once separate it; the body is also more parallel than in *Monocesta*, approaching in that respect Mr. Clark's very natural genus *Dircema*.

Sp. 1. *Chorina cincta*, Clark.

Monocesta cincta, Clark, Ann. & Mag. Nat. Hist. 1865, p. 315.

Sp. 2. *Chorina obliquenotata*, Clark.

Monocesta obliquenotata, Clark, *loc. cit.*

Genus Cerotoma, Erichson.

Sectio I. *Thorax profunde sulcatus, sulco plus minusve quadrisinuato; elytra valde costata.*

1. *Cerotoma DeGandei.*

Nigra, nitida, pedibus flavis (antennæ desunt); epistomate rude sed subremote punctato, medio longitudinaliter carinato, vertice subcrebre punctato; thorace punctato, profunde transversim sulcato, sulco quadrisinuato; elytris valde costatis, costis duabus internis fere obsoletis, interspatiis fortiter bifariam punctatis, apicem versus obsolete transversim costulatis, flavo-fulvis, fasciâ latâ subapicali nigrâ. (*Fœm.*)

Long. $4\frac{1}{2}$ lin.

Hab. Banks of Napo, Ecuador.

2. *Cerotoma heterocera.*

Pallide flava, nitida; antennis infuscatis aut piceis, articulis quatuor vel quinque ultimis albidis; capite thoraceque pallide rufo-piceis, illo vertice rugoso-punctato profunde unifoveolato, hoc subcrebre punctato profunde transversim sulcato, sulco quadrisinuato, lateribus flavo-limbatis;

elytris fusco-violaceis aut pallide violaceo-piceis, valde costatis, costis duabus interioribus minus distinctis.

A. Elytrorum limbo laterali maculisque quatuor, duabus prope medium, duabus ante apicem positis, flavis.

B. Elytrorum limbo exteriori, fasciâ prope medium plus minusve distinctâ, maculis duabus subapicalibus, costisque nonnullis flavis.

C. Corpore fulvo, elytris immaculatis.

Mas.—Capite inter oculos laminâ bilobatâ armato, lobis ad apicem deorsum curvatis, facie inter laminam et antennarum insertiones modice concavâ, lævi; epistomate bisexcavato, utrinque spinâ subacutâ curvatâ armato; antennarum articulis tertio quartoque incrassatis, compressis, conjunctim emarginatis, tribus basalibus flavis, nigro-maculatis.

Fœm.—Capite mutico; epistomate rude rugoso, medio longitudinaliter elevato; antennis simplicibus.

Long. 4 lin.

Hab. Amazons.

In the Rev. H. Clark's collection, some specimens of this species bear the name of "*heterocera*, Illig." I have retained the name, although I cannot find any reference to Illiger's description. As may be seen above, this insect varies greatly in coloration; it is somewhat larger and decidedly more robust than any of the other species described in the present paper.

3. *Cerotoma congener.*

Pallide flavo-fusca, nitida, supra pallide picea; vertice rugoso, profunde unifoveolato; thorace distincte punctato, profunde transversim sulcato, sulco quadrisinuato; elytris fortiter punctatis, valde costatis, costis duabus interioribus fere obsoletis, interspatiis irregulariter transversim costulatis, limbo exteriori costisque nonnullis flavis.

Mas.—Capite inter oculos laminâ bilobatâ instructo, lobis acutis, ad apicem vix deflexis; epistomate medio longitudinaliter carinato, utrinque profunde excavato, ad utrumque latus spinâ curvatâ subacutâ armato; antennarum articulis tertio quartoque incrassatis et compressis, conjunctim emarginatis, quatuor basalibus flavis, primo ad apicem secundo tertioque dorso nigris, quinto ad octavum piceis, tribus sequentibus sordide albidis, ultimo apice nigro.

Long. 3 lin.

Hab. Amazons.

Similar in form to, but smaller than, *C. heterocera*; epistome in the ♂ with the lobes of the facial plate subacute, scarcely deflexed.

4. Cerotoma excavata.

Pallide fusca aut picea, nitida; pedibus pallide flavis, femoribus dorso, posticis apice, tibiis extus, posticis totis, tarsisque fuscis; thorace albo-flavo, basi interdum longitudinaliter canaliculato, profunde transversim sulcato, sulco quadrisinuato; capite elytrisque piceis, his valde costatis, interspatiis fortiter punctatis, irregulariter transversim costulatis, basi extremâ, fasciâ latâ prope medium apiceque flavis; abdominis segmentis aut flavis aut flavo-marginatis.

Mas.—Capite inter oculos in laminâ bilobatâ producto, lobis obtusis, apice deflexis, facie supra laminam profunde excavatâ; epistomate medio longitudinaliter carinato, utrinque profunde excavato, utroque latere spinâ curvatâ apice subacutâ; antennis pallide flavis, articulis intermediis infuscatis, tertio quartoque incrassatis et compressis, conjunctim excavatis.

Fœm.—Epistomate rude rugoso, medio longitudinaliter carinato; antennarum articulis tertio quartoque longitudine æqualibus, sexto quam quinto distincte breviori.

Long. 3—3½ lin.

Hab. Nauta, Upper Amazons.

Narrower than *C. transversofasciata*; similar in pattern, but paler; front and epistome very deeply excavated, the latter only bispinose.

5. Cerotoma transversofasciata.

Flavo-alba, nitida; pectore abdomineque nigris, hujus segmentis flavo-marginatis; capite, scutello elytrisque nigro-piceis; his valde costatis, interspatiis bifariam punctatis, irregulariter transversim costulatis, fasciâ apicali alterâque prope medium flavo-albis; thorace profunde transversim sulcato, sulco quadriflexuoso; antennarum articulis quatuor ultimis sordide albidis, ultimo apice nigro; tibiis tarsisque plus minusve infuscatis.

Mas.—Capite inter oculos laminâ bilobatâ instructo, lobis obtusis, apice deflexis; epistomate quadrispinoso; antennarum articulis tribus basalibus flavis nigro-maculatis, tertio quartoque incrassatis et compressis, conjunctim emarginatis.

Fœm.—Epistomate rugoso, medio longitudinaliter carinato.

Long. 4 lin.

Hab. S. Paulo, Upper Amazons.

C. transversofasciata, although equally long, is much narrower than *C. heterocera*; the male is known by the four spines (instead of two) on the epistome; in addition to the two lateral ones, which are broad and compressed with obtuse apices, there are two others, subacute, placed on the anterior edge of the epistome.

6. *Cerotoma limbifera.*

Flava, nitida; antennis piceis, articulis quatuor ultimis flavo-albidis; capite thoraceque rufo-testaceis; illo vertice unifoveolato, epistomate ruguloso, medio elevato-carinato; hoc plus minusve distincte punctato, profunde transversim sulcato, sulco obsolete quadrisinuato; elytris valde costatis, interspatiis bifariam punctatis, irregulariter transversim costulatis, violaceo-piceis, rufo-testaceo-limbatis. (*Fœm.*)

Long. 3—3½ lin.

Hab. Amazons.

Narrower in form than *C. transversofasciata*, smaller and differently coloured; third and three following joints of the antennæ equal in length.

7. *Cerotoma Amazona.*

Sordide flava, nitida, pedibus fulvis; capite thoraceque pallide piceis; illo vertice minus profunde unifoveolato, epistomate tumido, lævi, basi obsolete carinato, antennarum articulis quinque ultimis albidis, ultimo apice nigro; hoc lævi, profunde transversim sulcato, sulco distincte quadrisinuato; elytris valde costatis, costis duabus interioribus minus elevatis, interspatiis fortiter punctatis, transversim costulatis, pallide violaceo-piceis, limbo marginali, fasciâ transversâ prope medium positâ extus abbreviatâ, maculâque rotundatâ subapicali flavis. (*Fœm.*)

Long. 3 lin.

Hab. Nauta, Upper Amazons.

Rather narrower than *C. heterocera*, smaller, and separated from that species by the smooth epistome.

8. *Cerotoma contubernalis.*

Flava, nitida; antennarum articulo ultimo apice nigro; capite pallide piceo, vertice profunde unifoveolato, subrugoso; epi-

stomate rude rugoso, medio longitudinaliter carinato; thorace subcrebre punctato, profunde transversim sulcato, sulco quadrisinuato; elytris fortiter punctatis, valde costatis, costis duabus internis fere obsoletis, interspatiis minus distincte transversim costulatis, violaceo-piceis, limbo exteriori fasciâque prope medium extus abbreviatâ, flavis. (*Fœm.*)

Long. 3 lin.

Hab. Amazons.

Broader and rather more convex above than *C. pulchra;* the fifth joint of the antennæ very slightly shorter than the fourth.

9. *Cerotoma pulchra.*

Flava, nitida; antennarum articulis intermediis piceis, ultimo apice nigro; capite thoraceque rufo-testaceis; illo vertice profunde foveolato, sparse punctato, epistomate medio longitudinaliter carinato, rude sed minus crebre punctato; hoc ad latera flavo-marginato, distincte punctato, profunde transversim sulcato, sulco quadrisinuato; elytris piceo-violaceis, valde costatis, interspatiis bifariam punctatis, irregulariter transversim costulatis, limbo exteriori, fasciâ latâ prope medium, maculâque transversâ subapicali limbo apicali affixâ, flavis. (*Fœm.*)

Var. A. Elytris pallide flavis, fasciâ basali plagâque subapicali pallide rufo-piceis.

Long. $3\frac{1}{2}$ lin.

Hab. Amazons.

The coarsely punctured epistome will at once separate this species from *C. Amazona.*

10. *Cerotoma perplexa.*

Sordide flava, nitida, tibiis ad apicem tarsisque obscurioribus, supra piceo-violacea; antennis crassiusculis, nigris, articulis quatuor basalibus subtus fulvis, quatuor ultimis albidis, secundo brevissimo, tertio et tribus sequentibus longitudine æqualibus; epistomate rugoso, medio longitudinaliter carinato; vertice subremote punctato, minus profunde unifoveolato; thorace subremote punctato, profunde transversim sulcato, sulco distincte quadrisinuato; elytris fortiter punctatis, valde costatis, costâ primâ minus distinctâ, interspatiis irregulariter transversim costulatis.

Long. $3\frac{1}{2}$ lin.

Hab. Amazons.

Antennæ rather thicker than in either of the two preceding species; the third and three following joints equal in length.

11. *Cerotoma alternata.*

Flava, nitida; ore, vertice, pectore scutelloque piceis; antennis nigro-piceis, articulis octavo apice tribusque ultimis albidis, ultimo apice nigro, tertio quam quarto distincte longiori; vertice minus profunde unifoveolato; epistomate inequaliter ruguloso, medio longitudinaliter carinato; thorace lævi, profunde transversim sulcato, sulco sat distincte quadrisinuato; elytris minus profunde punctatis, costatis, costis alternis minus distinctis, interspatiis planis, pallide violaceo-piceis, plagâ apicali costisque alternis flavis. (*Fœm.*)

Long. 3½ lin.

Hab. Amazons.

Smaller than, but similar in form to, *C. heterocera*; the third, fourth and fifth joints of the antennæ gradually decreasing in length.

Sectio II. *Thorax impressus vel sulcatus, sulco nunquam quadrisinuato; elytrorum costæ vel obsoletæ vel indistinctæ.*

12. *Cerotoma Deyrollei.*

Nigra; capite, thorace, scutello, abdomineque castaneis; pedibus flavo-fulvis; antennis, elytrorumque limbo inflexo et fasciis tribus (harum primâ basali, punctum humerale nigrum includente, secundâ prope medium, tertiâ apicali) flavis; epistomate subremote punctato, basi longitudinaliter carinato; thorace tenuiter subcrebre punctato, disco profunde transversim bifoveolato. (*Fœm.*)

Long. 2¾ lin.

Hab. Magdalena River, Columbia.

13. *Cerotoma quadripustulata.*

Nigra, nitida; capite, thorace scutelloque castaneis; thorace tenuiter punctato, arcuatim transversim sulcato, sulco utrinque profundius impresso; pedibus antennisque flavis, his extrorsum fuscis; elytris tenuiter punctatis, utrisque fasciâ ante medium antice emarginatâ utrinque abbreviatâ, maculâque subrotundatâ infra medium, flavis.

Mas.—Facie infra antennarum insertionem profunde excavatâ; antennis simplicibus.

Fœm.—Facie non excavatâ; epistomate convexo, remote punctato, basi obsolete carinato.

Long. $2\frac{3}{4}$ lin.

Hab. Guatemala, Mexico.

14. *Cerotoma Erichsoni.*

Nigra, nitida; pedibus, capite thoraceque flavis, vertice pallide castaneo; thorace vix transverso, tenuissime punctato, disco obsolete transversim impresso, vittâ latâ mediâ, basi et apice abbreviatâ, medio fulvo-lineatâ, nigro-piceo; elytris subfortiter punctatis, utrisque limbo inflexo, plagâ humerali, fasciâ transversâ centrali, margine apicali, vittâque obliquâ subapicali, flavis.

Mas.—Epistomate pube concolori dense vestito, basi transversim elevato; antennarum articulo tertio elongato, compresso, a basi apicem versus dilatato, apice extus profunde emarginato, quarto modice elongato, apice in spinâ acutâ prolongato.

Long. $2\frac{2}{3}$ lin.

Hab. Nauta, Upper Amazons; Peru.

15. *Cerotoma Salvinii.*

Nigra, nitida; capite (ore excepto) thoraceque pallide castaneis; hoc transverso, lateribus obtuse angulato, dorso subremote punctato, utrinque leviter impresso; pedibus antennisque flavis; elytris minute squamoso-reticulatis, subfortiter punctatis, utrisque limbo laterali, plagâ oblongâ subbasali, fasciisque duabus (unâ mediâ, alterâ subapicali flexuosâ) flavis.

Var. A. Elytrorum signaturis fere obsoletis.

Mas.—Capite inter oculos laminâ bilobatâ armato; facie infra laminam transversim concavâ, utrinque ad latus cretâ transversâ elevatâ instructâ, margine apicali spinis duabus curvatis armatâ; antennarum articulo tertio elongato, compresso, a basi apicem versus incrassato, apice profunde emarginato et spinâ acutâ armato, quarto brevi, vix dilatato, apice spinâ acutâ transversâ armato.

Fœm.—Capite mutico; epistomate nigro-piceo, rugoso, basi tumido.

Long. $2\frac{2}{3}$ lin.

Hab. Panama. Collected by Mr. Salvin.

XXVIII. *Descriptions of new* Hesperidæ. By W. C. Hewitson, F.L.S., F.Z.S.

[Read 6th November, 1865, 1st January, 5th February, 1866.]

Fam. HESPERIDÆ.

Genus Pyrrhopyga, Hübner, Westwood.

1. *Pyrrhopyga Sela.*

Pyrrhopyga Pityusa ♂, Hewitson, Ex. But. vol. ii. pl. 60.

2. *Pyrrhopyga Azeta.*

Alis atris, albo cæruleoque fasciatis; anticis maculis tribus fenestratis; posticis fasciis tribus.

Upperside, male, black. Anterior wing with two transverse bands of white near the base; two longitudinal bands parallel to the inner margin, three spots in an oblique band beyond the middle, and a small spot nearer the apex, all pale blue; a central trifid spot, a small spot (part of the oblique band of blue spots), and a quintifid band near the apex, all transparent white. Posterior wing with three oblique transverse bands: the first and second white, the outer band blue. The abdomen banded with white.

Underside as above, except that the outer band of the posterior wing is much broader near the costal margin, and is there divided into three.

Exp. 2 inches.

Hab. Amazon (St. Paulo).

In the Collection of W. C. Hewitson.

Resembles nearly *Erycides Papias.*

3. *Pyrrhopyga Ahira.*

Alis atris, albo cæruleoque fasciatis; anticis fasciâ angulari; posticis fasciâ latâ.

Upperside, male, black. Anterior wing with two transverse bands of white near the base; a broad trifid band of silver-blue, at first longitudinal and parallel to the inner margin, afterwards at a right angle with the same, and towards the apex three indistinct

spots of the same colour. Posterior wing crossed near the base by a band of white, and at the middle by a broad band of pale blue. The abdomen banded with white.

Underside as above, except that the longitudinal portion of the band of the anterior wing is absent.

Exp. $2\frac{2}{10}$ inches.

Hab. Amazon (Para).

In the Collection of W. C. Hewitson.

4. *Pyrhopyga Zonara.*

Alis atris, albo cæruleoque fasciatis; anticis maculis tribus fenestratis; posticis fasciis duabus.

Upperside, male, black. Anterior wing with a central trifid band, a bifid spot beyond it, and a quadrifid spot near the apex, transparent white; a transverse band of white near the base, a similar band of blue, a linear spot near it, a similar spot beyond the middle, and a linear band parallel to the outer margin, also pale blue. Posterior wing with a band of white parallel to the inner margin, a short band of blue beyond the middle, and two minute spots of the same colour near the anal angle. The abdomen banded with white.

Underside as above, except that there are two additional blue spots near the apex of the posterior wing.

Exp. $2\frac{2}{10}$ inches.

Hab. Amazon.

In the Collection of W. C. Hewitson.

Very closely allied to *P. Vulcanus*, but of different form, and with two bands only instead of four on the posterior wing. The body very large.

5. *Pyrrhopyga Oneka.*

Alis nigris, fasciâ communi ochraceâ; anticis fasciâ apicali.

Upperside dark brown. Both wings crossed near the middle by a band of ochreous spots. Anterior wing with an apical band of similar spots.

Underside as above, except that the posterior wing has an ochreous spot near the base. Head, palpi and anus scarlet.

Exp. $2\frac{3}{10}$ inches.

In the Collection of the British Museum.

Near to *P. Xantippe.*

6. *Pyrrhopyga Aspitha.*

Alis atris, ad basin ferrugineis; anticis maculâ tripartitâ fenestratâ; posticis dentatis, fimbriâ albâ.

Upperside, male, dark brown. The body, a transverse band near the base of the anterior wing, and a broader band on the posterior wing, rufous-yellow; a triangular trifid band of transparent white at the middle, the outer margin of the posterior wing dentated and fringed with white. The abdomen banded with white.

Underside as above, but without the bands of hair.

The female differs from the male in being of a darker rufous colour and in having more of the hair, and a minute white spot (sometimes two) on the costal margin near the apex.

Exp. $1\frac{9}{10}$ inch.

Hab. Amazon (Para and St. Paulo).

In the Collection of W. C. Hewitson.

Resembles *P. Coritus* of Cramer.

7. *Pyrrhopyga Thelersa.*

Alis cæruleo-atris, ad basin ferrugineis; anticis maculâ tripartitâ fenestratâ.

Upperside dark blue; the body and base of both wings covered with bright rufous hair. Anterior wing with a large trifid central spot of transparent white; the outer margin of the posterior wing not dentated, and not fringed with white. The abdomen banded with white.

Underside green-blue, with a few rufous hairs at the base.

Exp. $2\frac{1}{2}$ inches.

Hab. Amazon (St. Paulo).

In the Collection of W. C. Hewitson.

This may be a variety of *P. Aspitha*. It is, however, much larger, of a different colour, and without the white fringe to the posterior wing.

8. *Pyrrhopyga Pedaia.*

Alis viridi-atris; anticis maculâ tripartitâ fenestratâ; capite anoque sanguineis.

Upperside, male, body and wings blue-black. The forehead, the palpi, the femora of the anterior legs and the anus scarlet. Anterior wing with a central trifid spot of transparent white. Posterior wing fringed with white.

Exp. $2\frac{2}{10}$ inches.

Hab. Amazon (Ega).

In the Collection of W. C. Hewitson.

Scarcely differs, except in the antennæ, from *Erycides Arinas* of Cramer.

9. *Pyrrhopyga Hadora.*

Alis viridi-atris ; anticis maculâ tripartitâ fenestratâ.

Upperside, male and female, blue-black. The neck scarlet; the palpi and femora white. Anterior wing with a central trifid spot of transparent white. Posterior wing fringed with white.

Exp. $2\frac{2}{10}$ inches.

Hab. Amazon (Para and Ega).

In the Collection of W. C. Hewitson.

Very closely allied to *P. Pedaia*. There is a variety of the female of this species in which the posterior wing is dentated.

10. *Pyrrhopyga Passova.*

Alis viridi-atris ; posticis maculâ anali sanguineâ.

Upperside, male and female, green-black. The forehead, palpi, anus, and anal angle of the posterior wing, scarlet.

Underside with the base of both wings broadly white.

Exp. 2 inches.

Hab. Amazon (Ega) and Cayenne.

In the Collection of W. C. Hewitson.

Differs from *P. Mœnas* only in having the anal angle of the posterior wing more lobed, and scarlet.

11. *Pyrrhopyga Gazera.*

Alis atris ; posticis marginibus cæruleis.

Upperside, male, black. The head, the palpi and anus scarlet. Anterior wing glossed with green on the costal margin. Posterior wing with a marginal band of glossy blue, the margin broadly fringed with white.

Underside blue-black, with black hair near the base of both wings.

Exp. $1\frac{7}{10}$ inch.

Hab. Amazon (St. Paulo).

In the Collection of W. C. Hewitson.

12. *Pyrrhopyga Aziza.*

Alis atris ; posticis marginibus griseo-cæruleis, infra dimidio basali albo.

Upperside black. The head, palpi and anus scarlet. Posterior wing with the outer margin broadly bordered with pale blue, divided by the nervures.

Underside, posterior wing with more than the basal half (the base itself excepted) white.

Exp. $1\frac{9}{10}$ inch.

Hab. New Granada.

In the Collection of W. C. Hewitson.

13. *Pyrrhopyga Garata.*

Alis atris ; posticis margine albo, infra griseo-irroratis.

Upperside blue-black. The head, palpi and anus scarlet. Posterior wing bordered with white.

Underside as above, except that the posterior wing is irrorated with pale blue between the nervures from the middle to the outer margin.

Exp. $2\frac{2}{10}$ inches.

Hab. Surinam.

In the Collection of W. C. Hewitson.

14. *Pyrrhopyga Gortyna.*

Alis atris ; posticis maculâ albâ, angulo anali sanguineo.

Upperside, male, black. The forehead, palpi, anus, and anal angle of the posterior wing, scarlet. Posterior wing with a large white spot at the apex.

Underside black. Posterior wing with the basal half white.

Exp. $1\frac{8}{10}$ inch.

Hab. Amazon (Ega).

In the Collection of W. C. Hewitson.

Near *P. Hyperici* of Hübner.

15. *Pyrrhopyga Galgala.*

Alis atris ; anticis fasciâ lineari rufescenti.

Upperside black. The neck, forehead, palpi and anus scarlet. Anterior wing crossed obliquely near the middle by a linear band of orange-yellow ; the whole of the outer margin fringed with white.

Underside as above, except that the band of the anterior wing is shorter, and that the posterior wing is crossed by a similar band.

Exp. 2 inches.

Hab. Venezuela.

In the Collection of W. C. Hewitson.

16. *Pyrrhopyga Hadassa.*

Alis fuscis; marginibus aurantiacis; thorace fasciis duabus sanguineis.

Upperside, female, rufous-brown; the outer margins of both wings orange; a longitudinal band on each side of the thorax, and the anus, scarlet.

Exp. 2 inches.

In the Collection of W. C. Hewitson.

Closely allied to *P. Amyclas* of Cramer, but differs from it in having the longitudinal bands on the thorax, in which it resembles *P. Scylla* of Ménétries.

17. *Pyrrhopyga Telassa.*

Alis fuscis, marginibus aurantiacis; posticis infra maculis duabus sanguineis.

Upperside, female, rufous-brown; the outer margins orange, narrow; a longitudinal band on each side of the thorax, and the anus, scarlet.

Underside as above, except that there are two scarlet spots at the base of the posterior wing.

Exp. 2 inches.

In the Collection of W. C. Hewitson.

18. *Pyrrhopyga Zereda.*

Alis cæruleo-nigris; posticis margine aurantiaco.

Upperside, female, glossy blue; the posterior wing bordered with orange; the neck with a few scarlet hairs.

Exp. 2 inches.

Hab. Ecuador.

In the Collection of W. C. Hewitson.

Near to *P. Amyclas*, Cramer, as well as to the two preceding species.

19. *Pyrrhopyga maculosa.*

Alis nigris; anticis maculis decem albis, una minutissima; posticis infra dimidio basali aurantiaco.

Upperside, male, blue-black. Anterior wing with ten white spots; three in a line across the middle, three between them and the apex (one very minute), and four on the costal margin near the apex. Posterior wing with the fringe alternately black and white.

Underside. Anterior wing as above, except that there is a spot of orange near the base. Posterior wing with the basal half orange.

Exp. $2\frac{3}{10}$ inches.

Hab. Bogota.

In the Collection of W. C. Hewitson.

Genus Erycides, Hübner, Westwood.

1. *Erycides Telmela.*

Alis viridi-atris; anticis maculâ tripartitâ fenestratâ; posticis angulo anali sanguineo.

Upperside blue-green. The head, palpi, fore-femora, the anus underneath, and the anal angle of the posterior wing, scarlet. Anterior wing with a central trifid spot of transparent white, and occasionally nearer to the apex a minute spot of the same colour.

Underside as above, except that the outer margins of both wings are broadly brown, irrorated with grey.

Exp. 2 inches.

Hab. Amazon (Para).

In the Collection of W. C. Hewitson.

Very near to, if not a variety of, *E. Cleanthes* of Latreille.

2. *Erycides Thrasea.*

Alis atris; infra marginibus griseis.

Upperside, male, brown. The head and neck, palpi, fore-femora and anus, scarlet.

Underside brown, glossed with blue; the outer margins from the apex to the middle of each wing broadly grey.

Exp. $1\frac{7}{10}$ inch.

Hab. Amazon.

In the Collection of W. C. Hewitson.

Also near to *E. Cleanthes*, but without spots.

Genus Hesperia, Swainson.

I have adopted the genus *Hesperia* as characterized by Swainson. Some of the species now described are put by Professor Westwood into his genus *Goniloba*. I have so often expressed my opinion as to the worthlessness of descriptions only of nearly-allied species of *Lepidoptera*, that I wish to state here, that I only consider these descriptions as temporary, to secure to myself the pleasure of figuring them one day ere long as my own species. I have selected for this purpose those only which are most conspicuously characteristic and easily distinguished from each other.

1. *Hesperia Ægita.*

Alis fuscis; anticis maculis quatuor vitreis in triangulum dispositis; posticis infra maculis quatuor argenteis.

Upperside dark brown; the base of both wings ochreous. Anterior wing much elongated, with four central transparent spots in the form of a triangle, the middle spot within the said triangle. Posterior wing marked below the apex with an indistinct opaque ochreous spot.

Underside ochreous-brown. Anterior wing with the basal half dark brown, the spots as above. Posterior wing with the inner margin and anal angle dark brown; four central silver spots, one triangular and larger than the others.

Exp. $2\frac{3}{10}$ inches.

Hab. Para.

In the Collection of W. C. Hewitson.

Near to *H. Epitus* of Cramer, plate 343, but differs from it in its much greater length of wing and in the position of the silver spots. It is from the Collection of Mr. Bates.

2. *Hesperia Æstria.*

Alis fuscis; anticis maculis septem vitreis, quatuor in medio dispositis; posticis infra maculis sex—octo argenteis.

Upperside dark brown; the base of both wings ochreous. Anterior wing with seven pale-yellow transparent spots; four central, in the form of a triangle, the middle spot within the said triangle, and three together, minute, before the apex. Posterior wing with one semi-transparent spot.

Underside rufous-brown. Anterior wing as above, except that there is a yellow spot on the costal margin which joins one of the vitreous spots. Posterior wing with six or eight silver

spots; one at the base, minute; the spot nearest the costal margin sometimes absent, and that nearest the apex sometimes very minute.

Exp. $1\frac{9}{10}$—$2\frac{3}{10}$ inches.

Hab. Rio Janeiro.

In the Collection of W. C. Hewitson.

Also near to *H. Epitus* of Cramer, but differs from it in the number and position of the silver spots.

3. *Hesperia Anchora.*

Alis fuscis; anticis maculis quatuor vitreis, tribus in triangulum dispositis; posticis infra maculis duabus argenteis.

Upperside dark brown; the bases of both wings ochreous. Anterior wing with four transparent spots in the form of a triangle; the middle spot within the said triangle. Posterior wing with one minute opaque yellow spot.

Underside rufous-brown. Posterior wing with two central silver spots, one large and triangular, the other small.

Exp. $1\frac{8}{10}$ inch.

Hab. Para.

In the Collection of W. C. Hewitson.

Also near to *H. Epitus*, from which it differs in the position of the silver spots. It is from the Collection of Mr. Bates.

4. *Hesperia argentea.*

Alis fuscis; anticis maculis septem vitreis, quatuor in medio dispositis; posticis infra fasciis duabus latis argenteis.

Upperside rufous-brown. Anterior wing with seven transparent pale-yellow spots, four near the centre but placed widely apart, three together minute before the apex. Posterior wing with one opaque yellow spot.

Underside rufous-brown. Anterior wing with the vitreous spots as above; the spot nearest the costal margin touches a spot of yellow on the margin; the spot nearest the apex is covered by a band of lilac; the spot near the inner margin is obscured by a white spot. Posterior wing crossed obliquely by two broad silver bands connected in the middle, the outer margin touching the lower band, pale rufous.

Exp. $1\frac{9}{10}$ inch.

Hab. Guatemala.

In the Collection of W. C. Hewitson.

Allied to *H. Epitus*, from which it scarcely differs on the upperside. Below it differs remarkably from it and the species

described above. One of my specimens was kindly presented to me by Mr. O. Salvin.

5. Hesperia Chalestra.

Alis fuscis; anticis maculis octo vitreis, quatuor in medio dispositis; posticis maculis quatuor; his infra fasciâ maculisque tribus albis.

Upperside dark-brown; the base of both wings ochreous. Anterior wing with eight transparent spots; four in the centre, three together towards the apex, the eighth very minute and below the latter. Posterior wing with four spots, less transparent.

Underside rufous-brown. Anterior wing as above, except that the apical spots and the outer central spot are united by an ochreous spot. Posterior wing crossed obliquely by a broad white band, outside of which are three minute white spots; the anal angle and outer margin are also white.

Exp. $1\frac{9}{10}$ inch.

Hab. Minas Gueres.

In the Collection of W. C. Hewitson.

6. Hesperia Cunaxa.

Alis fuscis; anticis maculis novem vitreis, quinque in fasciam dispositis; posticis infra fasciâ punctoque albis.

Upperside dark brown. Anterior wing with nine spots, four of which only are transparent; five in an oblique band across the wing; three together towards the apex, and one minute above the largest spot of the band. Posterior wing with one bifid yellow spot.

Underside rufous-brown. Anterior wing as above, except that the two lowest spots of the band are united by a spot of white. Posterior wing crossed obliquely by a band of white, inside which is a minute white spot.

Exp. $1\frac{8}{10}$ inch.

Hab. Northern America.

In the Collection of Dr. Boisduval.

7. Hesperia Ceraca.

Alis fuscis; anticis maculis septem vitreis, quatuor in medio dispositis; posticis maculâ albâ; his infra fasciis duabus argenteis.

Upperside dark brown. Anterior wing with seven transparent

spots; four near the middle, one of which is bifid; and three towards the apex. Posterior wing with one white spot.

Underside rufous. Anterior wing as above, except that the basal half is dark brown, and that there is an ochreous spot on the costal margin. Posterior wing crossed obliquely by two bands of silvery white.

Exp. $2\frac{3}{10}$ inches.

Hab. Rio Janeiro.

In the Collection of W. C. Hewitson.

8. *Hesperia Ethoda.*

Alis fuscis; anticis maculis quatuor vitreis, posticis tribus ochraceis opacis; his infra fasciâ latâ albâ.

Upperside dark brown; the base of both wings ochreous. Anterior wing with four large central pale-yellow transparent spots. Posterior wing with three ochreous spots.

Underside rufous. Anterior wing as above, except that the basal half is dark brown, and that the two lower spots are united in one. Posterior wing crossed obliquely by a band of white, broadest in the middle.

Exp. $2\frac{2}{10}$ inches.

Hab. Rio Janeiro.

In the Collection of W. C. Hewitson.

9. *Hesperia Elia.*

Alis fuscis; anticis maculis decem vitreis albis; posticis fasciâ vitreâ albâ; his infra dimidio basali albo.

Upperside dark brown. Anterior wing with ten transparent spots; six in an oblique band from the middle of the inner margin to near the apex, the last two spots of the band near together and minute; three minute subapical spots; the tenth spot within the cell. Posterior wing with a central transverse band of four transparent spots.

Underside rufous-brown. Posterior wing with the basal half, except the costal margin, silvery-white.

Exp. $1\frac{9}{10}$ inch.

Hab. Sumatra.

In the Collection of W. C. Hewitson; from Mr. Wallace.

10. *Hesperia Attina.*

Alis fuscis; anticis maculis octo vitreis, tribus in medio dispositis; posticis dimidio interno albo.

Upperside dark brown. Anterior wing with eight transparent

white spots; three large ones in the middle, three towards the apex minute, and two below the latter, also small. Posterior wing with the inner half white.

Underside as above, except that the anterior wing has a band of lilac at and below the apex, and that the posterior wing is white, except the costal margin, a large space at the anal angle, and the nervures, which are dark brown.

Exp. $2\frac{1}{2}$ inches.

Hab. India and Java.

In the Collection of W. C. Hewitson.

A very large species.

11. *Hesperia Azona.*

Alis fuscis; anticis maculis quinque vitreis, duabus pone medium dispositis; posticis maculâ albâ anali.

Upperside dark brown. Anterior wing with five transparent white spots; two beyond the centre, three minute towards the apex. Posterior wing with a large white anal spot.

Underside as above.

Exp. 2 inches.

Hab. Macassar.

In the Collection of W. C. Hewitson; from Mr. Wallace.

12. *Hesperia Barea.*

Alis fuscis; anticis maculis sex albis vitreis pone medium dispositis; posticis maculâ magnâ anali albâ; his infra albis.

Upperside dark brown. Anterior wing with six transparent white spots; three in a line beyond the centre, and forming a right angle nearly with the three subapical spots. Posterior wing with a large white anal spot.

Underside. Anterior wing as above, except that the apex and costal margin are broadly rufous. Posterior wing white, with the costal margin and a band of spots on the outer margin rufous-brown.

Exp. $1\frac{8}{10}$ inch.

Hab. Sumatra.

In the Collection of W. C. Hewitson; from Mr. Wallace.

Nearly allied to *H. Azona*, from which it differs in form as well as in the white underside of the posterior wing.

13. *Hesperia Belistida.*

Alis fuscis; anticis maculis quinque aut sex obscuris; posticis dimidio interno albo; his infra albis, maculâ centrali anoque fuscis.

Upperside dark brown. Anterior wing with six very obscure pale spots; three beyond the middle parallel to the outer margin, and three before the apex. Posterior wing with a large space of white from the middle to the inner margin. The abdomen white.

Underside. Anterior wing with the basal half dark brown, the margins and apex broadly rufous; crossed from the inner margin towards the apex by an irregular band of white spots; the subapical spots and a spot within the cell white; the outer margin at and below the apex lilac. Posterior wing white, tinted with lilac at the base; a broad band of lilac at the apex and outer margin; a central spot of rufous-brown and an apical spot of dark brown.

Exp. $1\frac{7}{10}$ inch.

Hab. Para.

In the Collection of W. C. Hewitson.

14. *Hesperia Bursa.*

Alis fuscis; anticis maculis octo vitreis, tribus in fasciam dispositis; posticis maculâ centrali argenteâ.

Upperside dark brown, with eight transparent white spots; three forming a transverse band, three as usual before the apex, one towards the middle of the outer margin, and one (minute) near the middle of the inner margin. Posterior wing with a large central lustrous white spot.

Underside rufous-brown. Anterior wing as above, except that there are some rays of pale yellow near the apex. Posterior wing with the basal half pale yellow, traversed by nervures of dark brown.

Exp. $1\frac{7}{10}$ inch.

Hab. Para.

In the Collection of W. C. Hewitson; from Mr. Bates.

15. *Hesperia Cæsina.*

Alis fuscis; anticis fasciâ maculatâ obliquâ albâ; posticis maculâ centrali albâ.

Upperside dark brown. Anterior wing with a band of seven white spots from the inner margin towards the apex, the three

usual subapical spots represented by two very minute points. Posterior wing with a large central white spot.

Underside rufous-brown. Anterior wing as above. Posterior wing with a broad central band of white. The club of the antennæ white.

Exp. $1\frac{4}{10}$ inch.

Hab. Waigiou.

In the Collection of W. C. Hewitson; from Mr. Wallace.

16. *Hesperia Calvina.*

Alis fuscis; anticis maculis sex vitreis (duabus coalitis), in medio dispositis; posticis maculâ centrali albâ.

Upperside dark brown. Anterior wing with six transparent white spots, two in the middle united, three towards the apex, and one, minute and more opaque, near the inner margin. Posterior wing with a central white spot.

Underside as above, except that the minute spot near the inner margin is enlarged and united with the spot above it, and that the spot on the posterior wing is yellow.

Exp. $1\frac{4}{10}$ inch.

Hab. Para.

In the Collection of W. C. Hewitson.

17. *Hesperia Catina.*

Alis rufo-fuscis; anticis fasciâ trifidâ flavâ; posticis infra margine apicali flavo.

Upperside dark brown. Anterior wing with a trifid band of yellow. Posterior wing with the apical fringe yellow.

Underside as above, except that the apical margin of the posterior wing is yellow.

Exp. $1\frac{9}{10}$ inch.

Hab. Amazon (Tapajos).

In the Collection of W. C. Hewitson; from Mr. Bates.

Nearly allied to *H. Itea* and *Haworthiana* of Swainson.

18. *Hesperia Cathæa.*

Alis fuscis; anticis maculis tribus vitreis in triangulum dispositis, apice albo; posticis infra fasciâ longitudinali griseâ.

Upperside dark rufous-brown. Anterior wing with three transparent central pale-yellow spots placed in the form of a triangle; the apex white.

Underside as above, except that the anterior wing has the

apical half tinted with lilac and the nervures paler, and that the posterior wing has a longitudinal band of lilac-white and some of the nervures lilac. The antennæ ringed with white; the club white.

Exp. 2 inches.

In the Collection of W. C. Hewitson.

19. *Hesperia Certima.*

Alis fuscis; anticis maculis quatuor vitreis, duabus in fasciam junctis; posticis maculis tribus vitreis in fasciam dispositis.

Upperside dark brown. Anterior wing with four transparent central spots, two of which form a transverse band. Posterior wing with three small transparent spots in a line beyond the middle.

Underside lilac-grey. Anterior wing with the basal half dark brown; the spots as above; three indistinct brown spots towards the apex. Antennæ with a white ring below the club.

Exp. 2 inches.

Hab. Venezuela.

In the Collection of W. C. Hewitson.

On the underside this species closely resembles *H. Baroches* of Latreille; it is of the same lilac-grey, and has the three small triangularly-placed spots which are characteristic of that species.

20. *Hesperia Colenda.*

Alis fuscis; anticis maculis tribus vitreis; posticis margine abdominali et angulo anali aurantiis.

Upperside dark brown. Anterior wing with three transparent white spots, the two largest united and forming a transverse band. Posterior wing with the inner margin and anal angle rufous-orange, the fringe at the apex white.

Underside. Anterior wing as above, except that the apex is rufous, and that there is a large subapical lilac spot crossed by a zig-zag line of brown. Posterior wing rufous-brown, with the base, two transverse bands, and a band towards the outer margin, all lilac; the anal angle orange. Club of the antennæ white.

Exp. $1\frac{7}{10}$ inch.

Hab. Venezuela.

In the Collection of W. C. Hewitson.

21. *Hesperia Crotona.*

Alis fuscis; anticis fasciâ trifidâ punctoque vitreis albis; posticis infra rufo-fuscis, basi, apice fasciisque tribus lilacinis.

Upperside dark brown. Anterior wing with a trifid oblique

band and a minute spot between it and the outer margin transparent white.

Underside rufous-brown. Anterior wing as above, except that it has two lilac spots towards the apex. Posterior wing with the base, the apex, and three irregular bands, lilac.

Exp. $1\frac{7}{10}$ inch.

Hab. Venezuela.

In the Collection of W. C. Hewitson.

22. Hesperia Coryna.

Alis fuscis; anticis maculis quatuor vitreis, duabus in medio dispositis; posticis infra argenteis, margine costali fasciisque duabus rufis.

Upperside dark brown. Anterior wing with four transparent spots, two central, and two towards the apex.

Underside. Posterior wing of brilliant silver; the costal and outer margins and two longitudinal bands rufous.

Exp. $1\frac{4}{10}$ inch.

Hab. Amazon.

In the Collection of W. C. Hewitson.

23. Hesperia tessellata.

Alis fuscis; anticis maculis quatuor vitreis, tribus in medio dispositis, et strigis duabus basalibus; posticis infra albo nigroque tessellatis.

Upperside dark brown. Anterior wing with two bands of yellow from the base, and four transparent white spots, three central in the form of a triangle, and one towards the apex. Posterior wing with the centre ochreous.

Underside. Anterior wing with two bands of yellow spots towards the apex. Posterior wing pale yellow, with the nervures, some spots near the base, a band of similar spots beyond the middle, the outer margins, and a spot at the anal angle, all dark brown. The fringe of both wings white, spotted with brown. Antennæ ringed with white at the base of the club.

Exp. $1\frac{7}{10}$ inch.

Hab. Macassar.

In the Collection of W. C. Hewitson; from Mr. Wallace.

24. Hesperia Litana.

Alis fuscis; anticis maculis novem vitreis, duabus in fasciam dispositis; posticis tribus.

Upperside dark brown. Anterior wing with nine transparent

spots; two forming a central band; three as usual towards the apex; three below the last described and parallel to the outer margin, and one near the inner margin. Posterior wing with three transparent spots.

Underside rufous-brown, with the outer margins of both wings broadly grey. Anterior wing with the spots as above, except that the lower spot of the central band and the spot near the inner margin are united. Posterior wing with the basal half brown, marked with some darker spots and a spot of white; crossed beyond the middle by a band of white, which is broad near the costal margin and marked with a brown spot, narrow and formed of small spots where it crosses the middle, and bordered outside by spots of brown.

Exp. $1\frac{6}{10}$ inch.

Hab. Venezuela.

In the Collection of W. C. Hewitson.

25. *Hesperia Lutetia.*

Alis fuscis; anticis maculis novem vitreis, posticis tribus; his infra rufo-fuscis, fasciis flavis, maculâ centrali opacâ, margine apicali ochraceo.

Upperside dark brown, the bases of both wings canescent. Anterior wing with nine transparent spots; one in the cell, five in an oblique band, and three before the apex. Posterior wing with a transverse central band of three spots.

Underside rufous-brown. Anterior wing as above, except that the longitudinal band of spots is extended to the apex. Posterior wing with a band of pale yellow near the base composed of two triangles; a central spot of dark brown, bordered outwardly with yellow; the apical margin broadly grey.

Exp. $1\frac{9}{10}$ inch.

Hab. Rio Janeiro.

In the Collection of W. C. Hewitson.

Allied to *H. Dalman* of Latreille.

26. *Hesperia Opigena.*

Alis fuscis; anticis maculis octo vitreis, posticis quatuor in fasciam dispositis; his infra fusco cinereoque nebulosis.

Upperside dark brown. Anterior wing with eight transparent spots; one in the cell, four in an oblique band, and three before

the apex. Posterior wing with four spots, forming a transverse band.

Underside as above, except that the posterior wing is crossed before the middle and on the outer margin by broad bands of grey.

Exp. $1\frac{8}{10}$ inch.

In the Collection of W. C. Hewitson.

So nearly like *H. Lutetia* in general appearance that (if the *Hesperidæ* are subject to such great variation) it may be only a variety of it. The underside of the posterior wing is very different.

27. *Hesperia Ovinia.*

Alis rufo-fuscis; anticis maculis septem vitreis, posticis tribus in fasciam dispositis; his infra cinereo-rufis, maculis sex albis.

Upperside rufous-brown. Anterior wing with seven transparent spots. Posterior wing with three (one bifid).

Underside rufous-brown. Anterior wing as above, except that it is irrorated with grey near the apex. Posterior wing densely irrorated with grey, and marked with five white spots before the middle and a sixth near the inner margin, forming part of the band of transparent spots.

Exp. $1\frac{7}{10}$ inch.

Hab. Nicaragua.

In the Collection of W. C. Hewitson.

28. *Hesperia Peræa.*

Alis rufo-fuscis; anticis maculis septem vitreis; posticis infra basi fuscis, fasciâ maculatâ margineque exteriori lilacinis.

Upperside dark brown, covered with rufous hair, chiefly near the base. Anterior wing with seven transparent spots; one in the cell, four in an oblique band, and two before the apex.

Underside. Anterior wing as above, except that some of the nervures and the outer margin are lilac. Posterior wing with the base, a spot in the cell, a transverse band of spots (some of them white), and spots near the outer margin, lilac.

Exp. $1\frac{6}{10}$ inch.

Hab. Rio Janeiro.

In the Collection of W. C. Hewitson.

29. *Hesperia Ophiusa.*

Alis rufo-fuscis; anticis maculis novem vitreis, posticis sex in fasciam dispositis; his infra cinereis, fasciâ maculatâ triangulari, margine exteriori rufo-fuscis.

Upperside rufous-brown. Anterior wing with nine transparent spots; one in the cell, five in an oblique band, and three before the apex. Posterior wing with a straight transverse band of six transparent spots, and between them and the base two less distinct ochreous spots.

Underside. Anterior wing as above. Posterior wing grey, bordered with white spots and forming an acute angle near the middle of the outer margin, which is rufous brown.

Exp. 1½ inch.

In the Collection of W. C. Hewitson.

30. *Hesperia Memuca.*

Alis rufo-fuscis; anticis maculis quinque vitreis, posticis fasciâ flavâ; his infra coccineis, fasciis duabus flavis.

Upperside rufous-brown. Anterior wing with five transparent spots; three forming a central oblique band, and two before the apex. Posterior wing with a transverse curved central pale-yellow band.

Underside. Anterior wing rufous-brown, darkest in the middle; the apex grey, and a band below it rufous and yellow; the three transparent spots united in one. Posterior wing rufous, crossed by two broad bands of yellow; one at the base on the costal margin, the other in the middle, bordered outside with dark brown.

Exp. 1½ inch.

In the Collection of Dr. Boisduval.

A beautiful species, near to *H. Phyneus* of Cramer.

31. *Hesperia Phaetusa.*

Alis fuscis; anticis maculis sex argenteo-vitreis, posticis duabus; his infra rufo-fuscis, basi albis.

Upperside dark rufous-brown. Anterior wing with six silvery transparent spots; one in the cell, three forming a central band, and two before the apex. Posterior wing with two spots.

Underside dark rufous-brown. Anterior wing with the spots as above, except that the one near the inner margin is larger and

united to the spot above it; the costal margin from the base to the middle and rays near the apex ochreous-yellow. Posterior wing with the base broadly white, marked with indistinct brown spots.

Exp. $1\frac{4}{10}$ inch.

Hab. Amazon (Ega).

In the Collection of W. C. Hewitson; from Mr. Bates.

32. *Hesperia Physcella.*

Alis rufo-fuscis; anticis maculis septem vitreis, posticis duabus; his infra fasciâ latâ marginali albâ.

Upperside dark rufous-brown. Anterior wing with seven transparent spots; four forming a central oblique band and three before the apex. Posterior wing with two minute spots below the middle.

Underside rufous-brown. Anterior wing as above. Posterior wing with the outer margin broadly white.

Exp. $1\frac{6}{10}$ inch.

Hab. Rio Janeiro.

In the Collection of W. C. Hewitson.

Near to *H. Virbius* of Cramer, which has the white border on both sides of the wing.

33. *Hesperia Marsena.*

Alis rufo-fuscis; anticis maculis septem vitreis; posticis infra rufis, fasciâ longitudinali alterâque transversâ maculatâ argenteis.

Upperside rufous-brown. Anterior wing with seven transparent spots; two in the cell, two central, and three before the apex.

Underside. Anterior wing as above. Posterior wing rufous, with a longitudinal band near the costal margin from the base to beyond the middle, a linear spot near the base and inner margin, and a transverse central band of four spots, all silvery white; a line of minute white spots below the transverse band.

Exp. $2\frac{3}{10}$ inches.

Hab. Sumatra.

In the Collection of W. C. Hewitson; from Mr. Wallace.

34. *Hesperia Rona.*

Alis rufo-fuscis; anticis maculis quinque vitreis; posticis infra cæruleo-viridibus, fasciis duabus rufis.

Upperside rufous-brown. Anterior wing with five transparent spots; two in the cell and three forming an oblique band.

Underside. Anterior wing as above, except that the outer margin and a spot near the apex are green. Posterior wing green; the nervures, two transverse bands and the outer margin rufous-brown.

Exp. 1½ inch.

Hab. Amazon (Para).

In the Collection of W. C. Hewitson.

35. *Hesperia Amana.*

Alis rufo-fuscis; anticis maculis sex vitreis; posticis infra cæruleo-cinereis, maculâ mediâ fuscâ, venis albis.

Upperside rufous-brown. Anterior wing with six transparent spots; two in the cell, three forming an oblique band, and one before the apex. Posterior wing paler.

Underside. Anterior wing as above, except that the costal margin and apex are glossed with brilliant lilac-blue, in which the nervures are white. Posterior wing lilac-blue, the nervures white, the centre clouded with brown.

Exp. 1½ inch.

Hab. Amazon (Para).

In the Collection of W. C. Hewitson; from Mr. Bates.

36. *Hesperia Almoda.*

Alis rufo-fuscis; anticis maculis quinque vitreis; posticis infra cinereis, maculâ centrali fasciisque duabus fuscis.

Upperside dark brown; the base of the anterior wing and most of the posterior wing rufous-brown. Anterior wing with five transparent spots; three forming an oblique band, and two (one very minute) before the apex.

Underside. Anterior wing rufous-brown, the costal margin and apex lilac-grey. Posterior wing lilac-grey, with a spot at the end of the cell and two macular transverse bands of brown.

Exp. 1½ inch.

In the Collection of Dr. Boisduval.

37. *Hesperia Noseda.*

Alis rufo-fuscis; anticis maculis quatuor vitreis, posticis maculâ vitreâ; his infra cinereo-rufis.

Upperside rufous-brown. Anterior wing with four transparent spots; two in a band across the middle. Posterior wing with one spot nearer the apex than usual.

Underside. Anterior wing with the basal half rufous-brown; the apical half rufous and lilac-grey, marked with three brown spots in the form of a triangle. Posterior wing rufous and lilac-grey, the anal angle brown. The antennæ with a white ring below the club.

Exp. $1\frac{6}{10}$ inch.

Hab. Amazon (Tapajos).

In the Collection of W. C. Hewitson; from Mr. Bates.

This species belongs to the group of which *H. Certima* and *H. Cathæa* (*ante*, pp. 492, 493) form part.

38. *Hesperia Sala.*

Alis fuscis; anticis maculis quatuor vitreis; posticis infra cinereis, maculis fuscis in circulum dispositis.

Upperside dark brown. Anterior wing with four transparent spots; two in the cell, minute.

Underside grey. Anterior wing dark brown near the base; with three minute brown spots before the apex. Posterior wing with a spot near the middle, forming the centre of a circle of several similar brown spots.

Exp. $1\frac{3}{10}$ inch.

Hab. Singapore.

In the Collection of W. C. Hewitson; from Mr. Wallace.

39. *Hesperia Ogygia.*

Alis rufo-fuscis; anticis maculis quinque vitreis, quatuor in medio dispositis; posticis infra rufis, maculis duabus fasciâque transversâ fuscis.

Upperside rufous-brown. Anterior wing with five transparent spots; four together in the middle.

Underside rufous. Anterior wing with the base and centre

brown. Posterior wing with two brown spots before the middle and a transverse band of similar spots at the middle.

Exp. $1\frac{3}{10}$ inch.

Hab. Sumatra.

In the Collection of W. C. Hewitson; from Mr. Wallace.

40. *Hesperia Phiditia.*

Alis fuscis; anticis maculis sex vitreis, posticis maculâ vitreâ; his infra rufo-ochraceis, fasciâ fuscâ.

Upperside dark brown. Anterior wing with six transparent spots; two of which form a central band, three before the apex, and one near the inner margin. Posterior wing with one large spot.

Underside. Anterior wing as above, except that the costal and outer margins are broadly rufous-grey. Posterior wing ochreous, crossed at the middle by a band of four brown spots.

Exp. $1\frac{3}{10}$ inch.

Hab. Sumatra.

In the Collection of W. C. Hewitson; from Mr. Wallace.

PRIZE ESSAYS

OF

THE ENTOMOLOGICAL SOCIETY.

As an inducement to the study of Economic Entomology, and with a view to increase the practical utility of the Entomological Society, the Council offers Two Prizes of the value of Five Guineas each to be awarded to the authors of Essays or Memoirs, of sufficient merit and drawn up from personal observation, on the anatomy, economy, or habits of any insect or group of insects which is in any way especially serviceable or obnoxious to mankind. The Essays should be illustrated by figures of the insects in their different states, and (if the species be noxious) must show the results of actual experiments made for the prevention of their attacks or the destruction of the insects themselves.

One of the Prizes offered for 1865 was awarded to Alexander Wallace, Esq., M.D., M.R.C.P., of Colchester, for his Essay on "Ailanthiculture."

On some former occasions the Council has selected a definite subject, as *e. g.*, the *Coccus* of the Pine Apple, the larva of *Agrotis Segetum* (the large caterpillar of the turnip), &c. On the present occasion, the selection is left to the candidates themselves, provided only that the subject be one fairly belonging to the Economic branch of Entomology.

The Essays must be sent to the Secretary at No. 12, Bedford Row, indorsed with mottoes, on or before the 30th of November, 1866, when they will be referred to a Committee to decide upon their merits; each must be accompanied by a sealed letter indorsed with the motto adopted by its author, and inclosing his name and address.

The Prize Essays shall be the property of, and will be published by, the Society.

LONDON:
PRINTED BY C. ROWORTH AND SONS,
BELL YARD, TEMPLE BAR.

JOURNAL OF PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON,

1864.

February 1, 1864.

Frederick Smith, Esq., Member of the Council, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Proceedings of the Royal Society,' No. 59; presented by the Society. 'Sitzungsberichte der Königl. bayer. Akademie der Wissenschaften zu München,' 1863, ii. Part 1; by the Academy. 'Tijdschrift voor Entomologie,' Vol. vi. Parts 3—6; by the Entomological Society of the Netherlands. 'The Zoologist' for February; by the Editor. 'The Journal of the Society of Arts' for January; by the Editor. 'The Athenæum' for January; by the Editor. 'The Reader' for January; by the Editor.

The following addition, by purchase, was also announced: — 'Genera des Coléoptères d'Europe,' Livr. 117 à 120.

Election of President.

The Secretary gave notice that, in consequence of Mr. Stainton having declined to accept the Presidency, the Meeting to be held on the 7th of March next would be made Special, for the purpose of electing a President; and that the Council recommended Mr. Francis P. Pascoe for election to the vacant office.

Exhibitions, &c.

The Rev. Hamlet Clark exhibited a collection of Australian Phytophaga, composed partly of specimens from the cabinet of Mr. C. A. Wilson, of Adelaide, and partly of the proceeds of Mr. F. G. Waterhouse's journey of exploration across the interior of Australia.

Mr. S. Stevens exhibited specimens of butterflies of exotic hue, but of home manufacture; they were made of feathers, and intended for personal ornament.

Prof. Westwood remarked that great destruction of specimens of the more beautiful species of butterflies had taken place in Paris; large prices (larger than Entomologists could afford) had been given for the finest and most brilliant examples, which were used for ladies' head-dresses, &c., and of course destroyed in an evening. The feathery imitations were equally beautiful, more lasting, and would render unnecessary the wholesale destruction of the originals.

The Secretary exhibited part of the head of a coffee-cask recently received from Ceylon by Mr. R. L. Thomson, of Alderney Road, Mile End; the wood was thoroughly riddled by larvæ, apparently of the genus Anobium.

Prof. Westwood remarked that a Committee had for some time been engaged at South Kensington upon the question of the injury done to ancient wood-carving. The Report of that Committee will shortly be ready, and he thought it would be found both interesting and valuable.

Sir J. Hearsey exhibited a collection of Coleoptera from India and China; the principal part from the former country.

Prof. Westwood exhibited a specimen of "wild silk" placed in his hands by Mr. Daniel Hanbury; it had come from the State of Salvador, Central America, and was the work of a colony of larvæ described as "dark bluish, feeding on an oak bearing large acorns," the moth being "dirty gray." The Professor discussed at some length the probability of the silk being made economically useful.

Mr. F. Smith exhibited a collection of wasps' nests—one of Vespa rufa, the rest of V. vulgaris; they were in various stages of formation, the earliest consisting of only a single cup containing the first egg, others consisting of three or four cups, whilst others again were more complete. The whole had been artificially obtained by Mr. Stone, who tempted the wasps to build by excavating holes in banks and furnishing them with foot-stalks; in fact, Mr. Stone appeared to possess the power of inducing wasps to build nests of almost any shape he pleased.

Mr. T. W. Wood (who was present as a visitor) exhibited a mass of conjoined cells which had been found embedded in a piece of Honduras mahogany at Chatham Dockyard; the cells were in form like the honey-pots of a humble-bee, brittle and very light, and composed apparently of comminuted or triturated and agglutinated wood and earth. Mr. Bates suggested that they might possibly be chambers of a species of Termes, though he thought they were too large. No other Member hazarded a conjecture as to the origin of the phenomenon.

Prof. Westwood exhibited a further selection from the captures in the Zambesi country of the Rev. H. Rowley, and read the following description of a gigantic species of Moluris:—

Moluris (Phanerotoma) Rowleiana, *n. sp.*

Species magna et insignis, *M. Bertolonii* fere æqualis. Capite et pronoto nigris, opacis, punctatissimis; prothorace subquadrato, lateribus rotundatis, latitudine majori paullo ante medium. Elytris oblongo-ovatis, prothorace paullo latioribus, luteo-villosis, singulis costis quatuor obliquis nigris nitidis instructis; sutura nigra, nitida. Corpore subtus et pedibus nigris, subnitidis, punctatissimis; abdomine læviori.

Long. corp. unc. $1\frac{3}{4}$; prothoracis, lin. 6; elytr. lin. 14.

Habitat prope fluv. Shire, Zambesi.

Revdo. H. Rowley capta, et ad Museum Entomologicum Oxoniæ benevole communicata.

Prof. Westwood also read the following descriptions of two anomalous Carabideous beetles :—

Genus Delinius, *Westw.*

Genus novum Carabidorum, *Steropi madidi* habitu et statura. Antennæ breves, graciles, geniculatæ, articulo basali tertiam partem occupante. Caput mediocriter porrectum, labro in medio marginis antici prominenti. Mandibulæ graciles, acutæ, intus edentatæ. Maxillæ spina rigida apicali lobo interno, spinulisque margine interno armatæ. Palpi maxillares externi articulo apicali mediocre subsecuriformi. Palpi labiales magni, articulo ultimo magno securiformi. Mentum in medio emarginaturæ porrectum, truncatum. Prothorax subquadratus, lateribus rotundato-curvatis. Elytra ovalia. Tibiæ anticæ haud palmatæ, margine interno emarginatæ.

Sp. 1. D. Essingtonii, *n. sp.*

Niger, subnitidus ; capite sulcis duobus inter antennas, pronoto sulco medio in fossula parva ovali ante marginem posticum terminato, sulcisque duobus prope angulos posticos notato ; elytris striatis, costaque submarginali proditis.

Long. corp. lin. 8.

Habitat Port Essington, in Australia. In Mus. Hopeiano Oxoniæ.

Genus Spanus, *Westw.*

Genus novum Carabidorum, statura et habitu *Miscoderæ* ; *Axinidio* et *Dysphærico* affine. Caput parvum, porrectum. Prothorax globosus. Elytra ovalia, gibbosa, basi pedunculata. Labrum breve, profunde emarginatum. Mandibulæ apice acutæ, dente parvo subapicali marginis interni armatæ. Maxillæ lobo interno elongato, apice obtuso, longe ciliato. Palpi externi maxillares et labiales longi, fere æquales, articulo ultimo maximo, inflato, apice truncato. Mentum late emarginatum, margine antico incisuræ recto. Labium parvum, subtriangulare ; paraglossæ elongatæ, tenuissimæ, setosæ. Tibiæ anticæ haud palmatæ, intus pone medium emarginatæ. Tarsi quatuor antici articulis quatuor basalibus brevibus, latis, subcordatis.

Sp. 1. S. Natalicus, *n. sp.*

Niger, glaberrimus ; ore, antennis et pedibus piceo-rufis ; capitis vertice oblique bi-sulcato ; pronoto sulco tenui mediano impresso ; elytris stria profunda prope suturam, alteraque marginali, puncto prope basin, alteroque subapicali singulatim impressis.

Long. corp. lin. 3¼.

Habitat in Natalia. D. Guienzius. In Mus. Hopeiano Oxoniæ.

Mr. Waterhouse exhibited a specimen of Psammodius porcicollis and a specimen of Onthophilus exaratus, and read the following notes respecting them :—

"The specimen of Psammodius porcicollis I found mixed, in Kirby's British collection, with the Psammodius sulcicollis, which it greatly resembles ; the specimen of Onthophilus exaratus I have had for many years in my own British collection, where it stood with a specimen of Onthophilus sulcatus, and was supposed to be the same species ; the two insects in all probability having never been compared till within the

last few days, when, having determined to clean them, and mount them on card, I then perceived that they were distinct species. The history of the specimen is unknown to me, but I believe it was given me as the O. sulcatus. Both the insects exhibited, it would appear, are known only as inhabitants of South Europe. It is hoped that this notice will induce our Entomologists to examine their British collections, with the view of ascertaining whether they contain these species, and can furnish us with any information respecting them.

" Psammodius porcicollis (Aphodius porcicollis, *Illiger, Magazin für Insectenkunde*, ii. p. 195, 2, 1803) has the same thickly tuberculated head, the transverse ridges on the thorax, and strongly sulcated elytra, as in P. sulcicollis; its colouring, moreover, is the same, being pitchy black, with the legs and fore part of the head dull rufous; but it differs in being decidedly larger. The oblique ridges seen on the head of P. sulcicollis, and which converge and meet at an angle near the hinder part of the head, are scarcely to be traced in P. porcicollis, nor are the large punctures which are visible in the former insect on the back of the head. The thorax is relatively more ample in P. porcicollis, and the coarse punctures in the transverse sulci are more numerous and more evident, especially on the hinder part of the the thorax, behind the posterior transverse ridge: the elytra are more strongly sulcated, and the punctures in the sulci are larger, and separated from each other, for the most part, only by narrow transverse ridges; the interstices of the striæ are broader; and lastly, the outermost interstice is continued from the base of the elytron only about half-way towards the apex, so that the two outermost striæ become confluent beyond that part. The corresponding interstice in P. sulcicollis is at first (near the humeral angle of the elytron) united for a short distance with the much more prominent interstice which is nearest to it, and then is free, and extends to the apex of the elytron.

" Onthophilus exaratus, *De Marseul, Essai Monographique sur la Famille des Histérides, Ann. de la Soc. Ent. de France*, 3me série, iv. p. 552, sp. 2. Hister exaratus, *Illig. Magaz.* vi. 48, 25 (1807).— The insect exhibited is as large as the largest specimens of O. sulcatus, and is placed by De Marseul and others in the section of the genus in which there is an odd number of longitudinal ridges (5) on the dorsal surface of the thorax,—a section which includes our O. sulcatus; whilst our common smaller species, O. striatus, is placed in the section having an even number (6) of ridges on the thorax. Of course in the former case there would be a mesial ridge, and the species of the second section would be destitute of a mesial ridge, and thus two distinct types of sculpturing might be said to exist in these very closely-allied insects,—a peculiarity which would not be in accordance with our general experience. The O. exaratus, however, shows that such is not the case. All the species have six ridges. The differences in the three species are, that in O. striatus the four ridges on the dorsal surface of the thorax are equidistant and entire, and they extend from the base to the apex of the thorax; the other two ridges are short, confined to the hinder half of the thorax, and situated, one on each side, rather nearer to the lateral margin than to the dorsal ridges. In the other two species the above so-called four dorsal ridges are interrupted, the outer pair vanishing on the anterior third of the thorax, and the middle pair interrupted about midway between the base and apex of the thorax, and reappearing, more widely separated, on the fore part. In O. sulcatus the two middle ridges are almost united into one ridge, being separated only by a slender impressed line. In O. exaratus the two corresponding ridges are distinctly separated by a shallow, densely punctured groove; the space between them and the nearest adjoining

ridge on either side is, however, fully three times greater than that which separates the middle pair. O. sulcatus has the abbreviated outermost ridge on either side well developed and glossy. In O. exaratus it is represented by a mere swelling, nearly as densely punctured as other parts of the thorax. In both insects there are four large shallowish foveæ near the hinder margin of the thorax, separating the ridges; in O. striatus the foveæ can scarcely be traced; here the sides of the thorax at the base are parallel for a short distance, then they converge suddenly to the front. In O. sulcatus they converge from the base to the apex, but present a gently convex outline, and the part immediately below the anterior angle is somewhat inerassated and slightly rounded. In O. exaratus the sides of the thorax also converge, but are straight, excepting towards and near the anterior angles (which are depressed), where they gently bend inwards. The surface of the thorax is moderately densely and moderately finely punctured in O. sulcatus; in O. exaratus it appears under a common lens to be densely covered by very minute longitudinal scratches, separated by equally minute ridges; under a strong lens, however, punctures are visible, more especially on the hinder part of the thorax, but these punctures are confluent in the longitudinal direction. O. striatus presents a nearly similar condition of the sculpturing, but it is scarcely so dense and delicate on the disk of the thorax. The elytra are rather less convex in O. exaratus than in the other two species; in all they are covered by sharply impressed lines, separated by minute longitudinal ridges, besides which in O. striatus the dorsal surface of each elytron presents six equidistant and equally developed costæ, and a row of somewhat isolated punctures between them. In O. sulcatus the intermediate costæ—*i. e.*, the first (or that nearest the suture), third and fifth—are wanting, or rather they are not distinguishable (excepting in a slight degree in certain parts) from the very minute longitudinal ridges filling up the interspaces; of these there are five, the central one representing the costa; there are six rows of somewhat isolated punctures, as in O. striatus. O. exaratus presents an intermediate condition, for each elytron has six costæ, but the alternate ones are rather less raised; the punctures are much larger in their transverse diameter, filling up almost the whole interspace between the costæ. The first, third and fifth costæ (being those which are less elevated) are depressed, and punctured in parts. There are other differences in these insects observable in the structure of the legs and antennæ, but those already pointed out will render them easily distinguishable."

Major Parry read the following:—

Further Remarks on Mr. James Thomson's 'Catalogue of Lucanidæ.'

"Mr. James Thomson having kindly placed at my disposal for examination the type-specimens of some interesting species of Lucanoid Coleoptera formerly belonging to Count Dejean's collection, as well as of those species described by himself in his recently-published 'Catalogue of the Lucanidæ,' I have drawn up a tabular statement upon the synonymy of the species in question. To this I have added a few observations, and the whole may be considered as an Addendum to my Remarks upon Mr. Thomson's 'Catalogue' which have been already published in the Society's 'Transactions.' I am now able to state that the opinion therein expressed, that several of the species in question had previously been published, has, after a careful examination of the type-specimens, been fully corroborated. To those Members who are more particularly interested in the Lucanoid Coleoptera, the types of Count Dejean's species,

now exhibited, together with the handwriting of this celebrated Entomologist, cannot but prove interesting.

Mr. J. Thomson's Species.	*Synonymous with*
1. Prosopocoilus bulbosus, *Hope* (var. minor), *Thoms. Cat.* p. 396.	Macrognathus Spencii, *Hope*, *Cat.* p. 6, (var. max.)
2. Cladognathus astericus, ♀, *Thoms. Cat.* p. 417, *n. sp.*	Prosopocoilus occipitalis, *Hope*, *Cat.* pp. 4, 13.
3. Dorcus axis, ♂, *Dej. Cat.* (var. minor).	Dorcus bucephalus, *Perty*.
4. D. semirugosus, ♂ (var. minor), *Thoms. Cat.* p. 422, *n. sp.*	D. Tityus, *Hope*, *Tr. Ent. Soc.* iv. p. 74.
5. D. exaratus, ♀ (*Dej*)., *Thoms. Cat.* p. 426.	D. lineato-punctatus, *Hope*, *Cat.* p. 23.
6. D. Ceramensis, ♂, *Thoms. Cat.* p. 424, *n. sp.*	D. concolor, *Blanchard*, *Voy. Pole Sud.* iv. 138, pl. ix., fig. 10.
7. D. Diabolicus, ♂, *Thoms. Cat.* p. 423, *n. sp.*	D. Niponensis, *V. Vollenhoven*, *Tijd. v. Ent.* iv. p. 113, pl. vii. fig. 3.
8. Ægus cicatricosus, ♂, *Dej. Cat.*	Ægus Chelifer, *M'Leay*, *Hor. Ent.* p. 113.
9. Sclerostomus leiocephalus, ♂, *Thoms. Cat.* (var. minor).	Dorcus femoralis, *Guerin*, *Rev. Zool.* 1839, p. 303.
10. Scortizus cribratus, ♀, *Thoms. Cat.* p. 429, *n. sp.*	Sclerostomus Neotragus, ♂, *Westw. Tr. Ent. Soc.*, n. s., iii. p. 207, pl. xi. fig. 3.
11. Nigidius cornutus, *Thoms. Cat.* p. 401.	Figulus trilobus, *Westwood*, *Ent. Mag.* v. p. 263.
12. Figulus Australicus, *Thoms. Cat.* p. 432, *n. sp.*	F. regularis, *West. Ent. Mag.* v. p. 263.
13. F. vulneratus, *Thoms. Cat.* p. 433, *n. sp.*	? F. anthracinus, *Klug.*, *Ins. Madagascar*, p. 85.
14. Ceratognathus Westwoodii, ♂, *Thoms. Cat.* p. 433, *n. sp.*	Ceratognathus punctatissimus, *West. Tr. Ent. Soc.* ser. 3, i. p. 433, pl. xv. fig. 4.
15. C. Helotoides, ♀, *Thoms. Cat.* p. 434, *n. sp.*	Sinodendron ? areolatum, *West. Tr. Ent. Soc.* ser. 3, i. p. 430, pl. xiv. fig. 2.

"Professor Westwood's descriptions of the two last species were subsequent to those of Mr. J. Thomson.

Cantharolethrus Luxerii, ♂. Dorcus Luxerii, *Buquet*, *Ann. Soc. Ent. Fr.* (1843). Cantharolethrus Georgius, *Thoms. Cat.* p. 411 (1862).

"In alluding to the priority of Mons. Buquet's description of this interesting insect from Columbia (*vide* Tr. Ent. Soc. ser. 3, vol. i. p. 446), I referred to its connexion with the Chiasognathidæ rather than with the Lucanidæ, in which family Mr. Thomson has located it, placing the genus immediately before Lucanus. Upon a further examination of the species in question, I am now disposed to modify my former opinion, although not to the extent of placing Cantharolethus next to Lucanus; I think it has greater affinity to Cyclommatus, Macrocrates and Leptinopterus; to Cyclommatus in the triangular and depressed form of the head, the smooth and polished character of the elytra, and the unarmed four posterior tibiæ; to Macrocrates in the

robust and porrect mandibles, and more especially in the peculiar, slender and elongate antennæ, with their lengthened basal joint; and finally, to Leptinopterus in the ciliated and strongly acute posterior angle of the prothorax, more especially to be noticed in L. Fryi, *Parry*, a figure of which species, as well as of C. Luxerii, it is my intention shortly to publish; in this latter respect there is evidently a strong connexion with Chiasognathus and Sphænognathus.

Ægus cicatricosus.

"This insect, formerly belonging to Count Dejean's collection, is stated on the label to have been received from Java. I cannot but think this to be erroneous. In the first place, I have had the opportunity of examining various collections containing numerous series of well-known previously-described species from Java belonging to the genus Ægus, and I have never as yet been able to recognize another specimen of the insect alluded to. Secondly, numerous examples of it (now before the Meeting) have lately been received, both from Cambodia and Malacca, evidently identical with Count Dejean's species, and found (upon examination with a specimen in the British Museum collection notified as received from Mr. M'Leay) to be likewise identical with Ægus Chelifer, described by that Entomologist in the 'Horæ Entomologicæ,' p. 113, and stated to be from Australia. The last-mentioned habitat must also be incorrect, in corroboration of which opinion I may further add that Nigidius cornutus, described by Mr. M'Leay (*lib. cit.*) with the habitat of Australia, has recently been received both from Cambodia and Malacca; examples in the collections of Mr. W. Saunders and Count Mniszech being identical with a typical specimen in the British Museum.

"Mons. Reiche, in his 'Critique' upon Dr. Burmeister's 'Handbuch der Entomologie' (*vide* Ann. Soc. Ent. de Fr. vol. i. ser. 3, p. 82), states Count Dejean's insect to be identical with Dorcus cicatricosus of Wiedemann, from Java. In this I cannot agree, as, according to Wiedemann's description in the 'Zoologisches Magazin,' vol. ii. p. 108, it is evident that the insect there characterized represents a female, no allusion at all being made to the male. Wiedemann's species is no doubt, as suggested by Dr. Burmeister, the female of Ægus acuminatus, *Fab.*, a species far from uncommon in Java.

"With all these facts before me, I have but little hesitation in referring Count Dejean's species to Ægus Chelifer of M'Leay with the habitat of Cambodia and Malacca instead of Australia, and a distinct species from Ægus acuminatus of Fabricius.

"The interesting series of this species now exhibited, with their extraordinary variety of form and sculpture, shows the very great difficulty the Entomologist must experience in deciding as to the identity of species from a brief written description only, seeing that the same species may be most conscientiously described under three or four different names,—a fact which has, to my knowledge, already in several instances occurred.

"To obviate this inconvenience I would suggest to Entomologists who may hereafter describe any of the Lucanoid Coleoptera to have regard to and to notify the state of development of the specimens described. In using this expression I allude exclusively to the growth of the mandibles, those organs being of primary importance in this group of Coleoptera, exhibiting as they do the most anomalous character of the group, especially as regards their dimensions in comparison with the insect itself, and their extraordinary variability in form and sculpture. An acquaintance with numerous series of species of the different genera sufficiently establishes that three distinct

forms of development exist; these may be specified as—var. max., var. med., and var. minor; and if future describers will notify from which form their description is drawn up, such a notification will, I feel confident, considerably assist the student, and perhaps also prevent other Entomologists from describing as new species insects which, after all, are only subordinate modifications of form of species previously well known and described.

Prosopocoilus bulbosus, *Hope* ♂ (var. minor), *Thoms. Cat.* p. 396.

"I have examined the unique specimen in the Hopeian collection which was described by Mr. Hope (together with Lucanus bulbosus and other species) under the name of Lucanus Spencii in the 'Transactions of the Linnean Society,' vol. xviii. p. 589. I have no hesitation in regarding L. Spencii and L. bulbosus as identical. The type-specimen of L. Spencii is one with fully-developed mandibles. The name of Spencii has a slight priority (*vide* the publication alluded to), and, as well out of deference to the memory of that distinguished Entomologist, ought, I think, to be retained. The var. minor of this species appears to be far from uncommon; but the specimen in the Hopeian collection is the only one on record of the var. max.

Ceratognathus Helotoides, ♀, *Thoms. Cat.* p. 434.

"This species is the last of those described by Mr. Thomson in his 'Catalogue,' and, as I suggested in my former remarks, proves to be identical with the insect described and figured by Professor Westwood under the name of Sinodendron? areolatum, ♀ (*vide* Tr. Ent. Soc. 3rd ser. vol. i. p. 430). The general appearance of this species is, as notified by Prof. Westwood, far more in accordance with the genus Sinodendron than with Ceratognathus, but, as the male is at present unknown (although Mr. Thomson appears inadvertently to have described it), it must still remain a matter of doubt to what genus it ought to be referred. Professor Westwood, in a note at the end of his paper (*lib. cit.* p. 437), suggests that, in the event of the two species proving identical, the unintelligible nomenclature and description of Mr. Thomson ought to prevent the retention of the name he has given: although partially agreeing in this respect, the point is fairly open to discussion, and I should be glad to hear Members express their opinions upon it."

March 7, 1864.

Frederick Smith, Esq., Member of the Council, in the chair.

Special Meeting.—A Special Meeting was held, pursuant to notice, for the purpose of electing a President in the place of Mr. Stainton, who declined to accept the office.

The Chairman appointed Messrs. Haward and Sharp to be Scrutineers. A ballot was then held, and Francis P. Pascoe, Esq., F.L.S., &c., was declared to be duly elected President for 1864.

Ordinary Meeting.—The following donations were announced, and thanks voted to the donors:—

Donations to the Library.

'Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique: Bulletins des Séances de la Classe des Sciences, Année 1862;' 'Annuaire 1863;' presented by the Academy. 'Proceedings of the Royal Society,' No. 60; by the Society. 'Proceedings of the Natural History Society of Dublin,' Vol. iv. Part 1; by the Society. 'Proceedings of the Literary and Philosophical Society of Liverpool during the fifty-second Session, 1862-63,' No. xvii.; by the Society. 'Sitzungsberichte der Königl. bayer. Akademie der Wissenschaften zu München,' 1863, II. Heft 2 & 3; by the Academy. 'Notes on the Indian Bombycidæ,' by Capt. Thomas Hutton; by the Author. 'The Classification of Animals, based on the Principle of Cephalization; Part 2, On Fossil Insects from the Carboniferous Formation in Illinois;' by James D. Dana; by the Author. 'Chilonidarum et Crambidarum Genera et Species,' Scripsit P. C. Zeller; by the Author. 'The Intellectual Observer,' Nos. 25 and 26; by the Publishers. 'The Zoologist' for March; by the Editor. 'The Transactions of the Linnean Society of London,' Vol. xxiv. Part 2; by the Society. 'The Journal of the Society of Arts' for February; by the Society. 'The Athenæum' for February; by the Editor. 'The Reader' for February; by the Editor. 'Verhandlungen des Naturforschenden Vereines in Brünn,' Band I. 1862; by the Society. 'Wiener Entomologische Monatschrift,' Vol. vii. Nos. 1—12; by M. Lederer.

The following additions by purchase were also announced:—'Fauna Austriaca: Die Fliegen (Diptera),' von J. Rudolph Schiner. 'Berichte über die Wissenschaftlichen Leistungen im Gebiete der Entomologie,' von Dr. A. Gerstaecker, 1853—1861; Berlin, 1855—1863.

Election of Member.

R. W. Fereday, Esq., of Oakley Station, Christ Church, Canterbury, New Zealand, was ballotted for and elected a Corresponding Member.

Exhibitions, &c.

Mr. Waterhouse exhibited two species of Aleochara hitherto unrecorded as British:—

1. A. procera, *Kraatz*, *Ins. Deutschl.* p. 97 = Ocalea procera, *Erichs. Gen. et Sp. Staph.* p. 61. Found at Reigate by Mr. Linnell.
2. A. fumata, *Erichs. lib. cit.* p. 166, *Kraatz*, *lib. cit.* p. 93. Found in Scotland by Mr. Morris Young and by Mr. Waterhouse himself.

Mr. Waterhouse also exhibited specimens of Aleochara brunneipennis, *Kraatz*, = sanguinea, *Kirby*, and called attention to the fact that that species was identical with the A. mœrens, *Thoms.*, as he had ascertained both from the description and by comparison with a specimen received from Thomson by Mr. Crotch.

Prof. Westwood exhibited the sexes of Ramphorhina Petersiana, a splendid Goliath beetle, brought from the Zambesi by the Rev. H. Rowley, the female being then for the first time exhibited; also several species of Lepidoptera from the Zambesi, amongst which was a new species of Charaxes, which considerably resembled an Argynnis, and of which the following description was read:—

Charaxes Argynnides, *Westw.*

C. alis anticis apice rotundatis, margine apicali in medio emarginato; posticis sinuatis, bicaudatis; omnibus suprà saturate fulvis, limbo apicali nigro, fulvo-maculato; anticarum cellula discoidali nigro bimaculata, macula externa curvata, et macula trifida terminata; pone medium alæ maculis quinque in lineam curvatam dispositis; posticis striga undata interrupta, e maculis minutis fuscis formata, per medium alæ currente, limbo nigro, serie duplici lunularum fulvarum submarginalium; anticis subtus disco magis rufescenti, macula tripartita subcostali pone medium notatis; posticis obscurioribus, dimidio basali maculis irregularibus albidis, nigro antice marginato, limbo griseo luteo albido fuscoque striolato.

Exp. alar. unc. $2\frac{6}{10}$.

Habitat Zambesi, Africæ. D. Rowley. In Mus. Hopeiano Oxoniæ.

At first sight this butterfly might almost be taken for one of the Fritillaries, Atella Phalanta, to which tails had been added. To some of the Vanissidans, such as Eurema Paullus, it also bears a considerable resemblance; but its nearest direct ally is the African Charaxes Neanthes of Hewitson, from which, however, it is very distinct, belonging to a different section of the genus.

Prof. Westwood also read the following description:—

Papilio Hewitsonii, *Westw.*

♂ Corpore nigro, albo-punctato; alis anticis elongato-ovalibus, posticis subrotundatis; anticis suprà nigris, immaculatis; posticis fuscis, venis nigris, angulo anali macula fulva in marginem analem extensa, et duplici serie macularum griscarum submarginalium fere indistincta inter venulas medianas notatis; alis infrà rufo-fuscis, posticis macula anali, fulva supra, punctis duobus nigris maculisque duabus cuneatis griseis coronata, serieque submarginali macularum griscarum hastiformium; ani lobis duobus oblongis magnis, singulo macula oblonga albo-notato.

Exp. alar. unc. $3\frac{2}{10}$.

Habitat in Borneo. In Mus. Hewitsonio.

Syn. Papilio Slateri, ♀, Hewitson, Exot. Butt. ii. Papilio, tab. iv. fig. 9.

Mas Papilionis Slateri (Bdv. M.S., Hewitson, l. c.), ex India Orientali (Sylhet), differt alis anticis magis triangularibus, posticis etiam subtriangularibus, anticis nigris, macula tripartita pallide cærulea ad apicem cellulæ discoidalis, striisque novem longitudinalibus ejusdem coloris inter medium et apicem extensis;

posticis fuscis vel rufo-fuscis, macula parva fulva ad angulum ani, nigro suprà cincta, in marginem analem haud extensa; alis subtus rufo-fuscis, anticis macula parva ovata ad apicem areæ discoidalis, et serie fere obsoleta macularum griscarum inter medium et apicem; posticis macula ad angulum analem nigro suprà cincta, et serie submarginali macularum plus minusve distincta et squamis griseis formata notatis; ani valvulis nigris, singulis macula oblonga alba notatis.

Prof. Westwood also read the following descriptions of new species of Coleoptera:—

Genus APATETICA, *Westw. Cab. Orient. Entom.*

Apatetica Nitiduloides, *Westw.*

A. nigra, nitida, punctata, elytris chalybæis, antennis extrorsum paullo crassioribus, prothorace lateribus rotundatis, dilatato-marginatis, antice multo angustiori, disco rude punctato, elytris profunde punctato-striatis, angulo externo postico acuto, abdomine pone elytra triangulariter porrecto, tarsis anticis dilatatis, antennis pedibusque nigris.

Long. corp. unc. $\frac{3}{10}$.

Habitat in Java. In Mus. D. Wallace.

Genus SYNTELIA, *Westw.*

Genus novum Trogositidum, *Platycerum Caraboidem* simulans. Corpus oblongum, subdepressum, glabrum. Caput porrectum, subquadratum. Mandibulæ magnæ, porrectæ, intùs irregulariter dentatæ. Maxillæ bilobæ, lobis simplicibus longe ciliatis, interno brevi ovali, externo elongato. Palpi omnes subfiliformes, articulis extensis æqualibus. Mentum subquadratum. Labium setosum, profunde incisum. Antennæ in fossulis obliquis faciei inferæ receptæ, breves, 11-articulatæ, subgeniculatæ; clava magna, depressa, ovata, fere solida, 3-articulata. Prothorax capite paullo major, subquadratus, tenue marginatus, antice parum latior, angulis anticis rotundatis. Tibiæ omnes extùs spinosæ. Tarsi simplices, 5-articulati, articulo ultimo elongato, clavato. Prosternum ante coxas anticas prominens. Abdomen 5-articulatum, articulis tribus intermediis brevioribus.

Sp. 1. Syntelia Indica, *Westw.*

S. chalybæo-nigra, nitida, capite sparsim punctato, prothorace lævi, lateribus et versus angulos posticos punctato, elytris tenue punctato-striatis, stria prope suturam alteraque subhumerali profundis, podice punctato.

Long. corp. unc. $\frac{6}{10}$.

Habitat in India Orientali. In Mus. Hopeiano Oxoniæ (olim nostro).

Sp. 2. Syntelia Mexicana, *Westw.*

S. præcedenti simillima, chalybæo-nigra, nitida, capite valde convexo, parum punctato, pronoto convexo, in medio postice depresso, irregulariter at rude punctato, præsertim versus latera et marginem posticum, elytris striato-punctatis, punctisque majoribus strias transversim conjungentibus notatis, podice punctatissimo, metasterno impressione media ovali, lineaque longitudinali impressa.

Long. corp. unc. $\frac{6}{10}$.

Habitat in Mexico. In Mus. Mniszech.

Prof. Westwood also remarked that Spanus Natalicus, *Westw.* (*ante* p. 3), was possibly identical with Dyschiridium ebeninum, *Chaudoir*, although there seemed to be some discrepancies in the structure of the trophi.

Prof. Westwood also exhibited larvæ of Endrosis fenestrella, which had been sent to him by a correspondent, and which were accused of having made numerous holes in a carpet which had been laid down new in September or October last: on taking up the carpet, the larvæ were found on or in the interstices between the boards of the floor, but the larva-cases did not appear to be formed of particles of the carpet.

Mr. Stainton remarked that the only evidence against the Endrosis larvæ was their propinquity to the carpet; he had never hitherto detected that species in the commission of similar injury.

Mr. Bond, however, had no doubt that they would attack carpets; he himself had once had a coat destroyed by them.

Prof. Westwood said that another correspondent had called his attention to the injury done to the leather binding of books by Ptinus hololeucus, a well-known beetle, which he believed to have been imported into this country from Russia some thirty years ago in a cargo of leather, and which was now thoroughly naturalized. This also was a case of first conviction, for he had not before met with any instance of this insect doing actual harm.*

Mr. S. Stevens exhibited a collection of Coleoptera and Lepidoptera from Old Calabar.

Mr. S. Stevens also read a letter from Mr. John Young, on the subject of the swarms of small ants found in his house in Guildford Street; see 'Proceedings' for October, 1863. Mr. Young stated that he had removed the pest by the use of Dumont's Insect-destroying Powder, by puffing the powder into the crevices from which the ants issued, and laying it on the ledges, &c., on which they appeared.

Mr. Waterhouse exhibited several portions of nests of bees, wasps and hornets, in illustration of the paper mentioned below.

Papers read.

Mr. Baly read a paper entitled "A Catalogue of Cassididæ collected by Mr. A. R. Wallace in the Eastern Archipelago, with Descriptions of the New Species."

The Secretary read the first part of a paper, by Mr. Pascoe, entitled "Longicornia Malayana; or, a Descriptive Catalogue of the Species of the three Longicorn Families, Lamiidæ, Cerambycidæ and Prionidæ, collected by Mr. A. R. Wallace in the Malay Archipelago."

Mr. Waterhouse read a paper "On the formation of the Cells of Bees," in which the Author defended what may be termed the circular theory of formation, which was first promulgated by himself nearly thirty years previously.

A discussion ensued, in which Mr. Bates and Prof. Westwood took part: Mr. Baly mentioned some observations made by himself on the formation of the nests of certain wasps, as corroborating Mr. Waterhouse's view; and Mr. A. R. Wallace expressed his concurrence in the theory. Mr. Frederick Smith, however, was not of the same opinion, and promised to bring before the Society, at its next Meeting, certain facts which, to his mind, were conclusive against the circular theory.

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* See 'Journal of Proceedings' for September, 1862.

April 4, 1864.

F. P. Pascoe, Esq., President, in the chair.

Mr. Pascoe thanked the Society for electing him to fill the Presidential Chair; and nominated as Vice-Presidents Mr. Stainton, Mr. A. R. Wallace and the Rev. Hamlet Clark.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Sitzungsberichte der Königl. bayer. Akademie der Wissenschaften zu München,' 1863, II. Heft 4; presented by the Academy. 'The Zoologist' for April; by the Editor. 'The Classification of Animals based on the Principle of Cephalization. No. III. Classification of Herbivores;' 'Note on the Position of Amphibians among the Classes of Vertebrates;' by the Author, James D. Dana. 'Stettiner Entomologische Zeitung,' 1864, Nos. 1—3; by the Society. 'Exotic Butterflies,' Part 50; by W. W. Saunders, Esq. 'The Natural History of the Tineina,' Vol. viii., containing Gracilaria, Part i., and Ornix, Part i.; by H. T. Stainton, Esq. 'The Intellectual Observer,' No. 27; by the Publishers. 'The Reader' for March; by the Editor. 'The Journal of the Society of Arts' for March; by the Society.

The following additions by purchase were also announced:—Grenier, A., 'Catalogue des Coléoptères de France.' De Marseul, S. A., 'Catalogue des Coléoptères d'Europe et du Bassin de la Méditerranée en Afrique et en Asie,' deuxième edition.

Election of Member.

P. H. Harper, Esq., of 30, Cambridge Street, Hyde Park Gardens, was balloted for and elected a Member of the Society.

Exhibitions, &c.

Mr. Frederick Smith—after remarking that his attention had been called to a note appended by the Editor of the 'Zoologist' (Zool. 8975) to an extract from his Address to the Society on the 25th of January last, the passage extracted being that relating to the luminosity of Fulgora, and the note being in the following words, "I believe the Honduras fire-fly with intermittent light is an Elater; if so, the Fulgora question remains *in statu quo*,"—said that he had since had supplied the further evidence of another eye-witness of the luminosity of the lanthorn-fly. Mr. James Smith, of 23, Wilton Row, Queen's Road, Dalston, made the following statement:—

"The Fulgora candelaria is found most plentifully between the months of May and August; it is occasionally seen in the winter, but these, I think, are hybernated specimens; it is then not luminous, and very much faded. In the summer it has a pale blue or green light at the end of the snout, which may be considerably augmented by a gentle pressure of the insect; it is brightest in the female. It is common throughout all China, and called the 'Star of Eve,' 'Eye of Confucius,' 'Spark-fly'; and the same insect is called, in the winter, the 'Flying Elephant,' perhaps in reference to its long proboscis. When the insect is settled the light is more luminous than when it is flying, and when the male and female have mated it is wholly extinguished. The

male, I believe, does not survive many hours, as I never caught one in the summer which was not luminous. They fly in swarms, and I have repeatedly taken two or three species in the same swarm. They are most plentiful in gardens, though they are found everywhere. The Chinese ladies catch them and imprison them in a fine gauze net, and wear them in their hair."

Mr. W. F. Evans said that Sir John Barrow's experience was in favour of the luminosity of Fulgora.

Mr. Newman remarked that his note on Mr. F. Smith's former statement was confined to that part which referred to the Honduras fire-fly, *i.e.* to Fulgora laternaria, not F. candelaria. Nothing that had been adduced that evening had any bearing upon the luminosity of F. laternaria.

Mr. Bates said that Fulgora laternaria was pretty common on the Upper Amazons; he had been aware of Madame Merian's statement, and had observed the insect closely; but he had never found it luminous, and, what was stronger than the negative evidence of any single observer, there was no rumour or idea existing amongst the natives to the effect that it was luminous. The natives were well acquainted with the insect, which was the subject of fables current amongst them; for instance, a tale was told of one of these insects having emerged from the forest and attacked a boat's crew of nine persons, eight of whom were killed by the poisonous creature, and the pilot only escaped by jumping into the river. But though the fly was thus reputed to be venomous, there was no story current of its being luminous. Mr. Bates himself was of opinion that Fulgora laternaria was not luminous, and (strange as it might seem) that the Honduras correspondent on whose statement Mr. F. Smith relied had attributed to the Fulgora what, in fact, was the luminosity of a Pyrophorus.

Mr. Newman (on behalf of Mr. Butler, who was present as a visitor) exhibited a number of insects embedded in amber and gum-animè differing from those of which an account was given by Hope in the first and second volumes of the Society's 'Transactions.' The amber was from the Baltic, the gum-animè (which, by the bye, was a resin, not a gum) from the East Indies; one of the amber-insects was peculiar from having enclosed with it a globule of air and a globule of water.

The President exhibited several new Australian Longicornia, presented to him by Mr. F. G. Waterhouse, of Adelaide, some of which were taken by that gentleman during the recent exploring expedition under Stuart; among the more interesting was a new genus, in some respects connecting those remarkable and isolated forms Bimia and Hesthesis. Also a considerable number of new species from Gawler, near Adelaide, part of a large collection for which he was indebted to Mrs. Kruesler and Mr. Odewahn; one of these had the appearance of a Malacoderm, for which, at the first glance, it might very readily be taken. It might, in fact, be regarded as another case of "mimetic resemblance"; but if so, there was this peculiarity about it, that the stronger insect was here imitating the weaker, which seemed not quite consistent with the theory that the imitated form was copied with a view to the protection of the imitating.

Mr. A. R. Wallace said that the case was quite consistent with the theory of mimetic resemblances, and that that theory did not depend upon the relative strength or weakness of the imitated or imitating forms; an insect might be very weak in structure, and yet be a proper subject for mimicry; many insects of weak structure were extremely abundant, were, in fact, dominant species; such species no doubt possessed some protection against their enemies with which we were unacquainted,

and of which other species of stronger structure were deprived; and having that protection, whatever it might be, they were on that account fit and likely subjects for imitation. So far from conflicting with the theory, he felt no surprise whatever at finding a structurally-stronger insect mimicking a Malacoderm.

The President also exhibited diagrams of the under surface of the abdomen of the females of Obrium cantharinum and other Longicornia, showing the presence of large lumps or tufts of hair on particular segments; he was anxious to ascertain whether such a structure was invariably present in the female; he had reason to believe that in some Australian genera (Penthea and Symphyletes) it was not invariably present, but further observation was required. If it should prove that it was not invariably present in the female, this would furnish another instance of "dimorphism," by which he (Mr. Pascoe) meant a case where there was an addition to or alteration of a part or organ; the term, in his opinion ought to be confined to such a phenomenon, and was not applicable to simple variation, such, *e.g.*, as variation in colour.

Mr. A. R. Wallace exhibited specimens of Papilio Memnon, P. Pammon, P. Theseus, P. Ormenus, P. Erectheus and P. Tydeus, for the purpose of illustrating his views on "polymorphism." Mr. Wallace remarked that *he* did not apply the term "dimorphism" to simple variation; on the contrary, he regarded "polymorphism," of which "dimorphism" was but the first and least complicated stage, as a totally different phenomenon from "variation," and one which required a separate name. Under the common term "variety" many distinct phenomena were confounded; he proposed to confine that term to those cases in which there was indefiniteness and irregularity in the variation. "Variation," then, was an indefinite and inconstant phenomenon, the instances of which passed from one to the other by irregular, often by insensible, gradations; "polymorphism," on the other hand, consisted in the existence of several distinct forms of the same insect which do not graduate into each other. Thus, in Papilio Memnon, the male was in each locality constant; it had rounded hind wings, and was always nearly black, with a few ashy rays; the female, however, existed under two distinct forms; the first had the wings shaped like those of the male, but had a very different colouration, being more or less olive-coloured, and often banded on the hind wings with whitish yellow, and with marginal black spots; the second form of female differed remarkably from the first, the hind wings being produced into a large spatulate tail, and marked with white patches radiating from the base. Both these forms exhibited varieties in the same locality, but there were no connecting links between them. The males paired with both forms of female, and in each case the resulting brood assumed the distinct forms above described. This was a case of dimorphism. Papilio Pammon was a parallel case; there was a form of female resembling the male, and there was a second aberrant form of female, *viz.* the form which had been called P. Polytes: he believed that P. Romulus would prove to be a third form of the female of P. Pammon, though of this he had not evidence at present; but the male of P. Romulus had never been found, whilst the females occurred along with P. Pammon in every collection from India: if that were so, then P. Pammon would exhibit an instance of trimorphism. P. Ormenus was certainly trimorphic, for three distinct forms of female were found, all differing greatly from the male; and Mr. Wallace had reason to believe that to some males of Papilio as many as four distinct wives must be assigned. These forms had hitherto been classed as varieties, but the physiological differences presented by them were striking.

Mr. Wallace further distinguished between a "variety" and a "local form" or

"race," denoting by the latter term a form which kept distinct from the parent stock and propagated itself independently: such a form was not a "variety" by reason of its constancy and the absence of intermediate links, and could not be considered a "species" by reason of the comparative unimportance of the characters in which it differed from the type-form. The subject of Mr. Wallace's remarks had been treated by him at length in a paper recently read before the Linnean Society: he further illustrated the phenomenon of polymorphism by the following hypothetical case:—Imagine the discovery of an island inhabited by white men, and black (negro), red (Indian), and yellow (Chinese) women, and in which the union of these variously-coloured parents produces children which always resemble one or other of the four above-mentioned forms, no intermediate forms ever occurring; the boys are always white, whilst the girls are black, red or yellow, but without any necessary connexion with the colour of the mother, so that a black girl may be the offspring of a white father and of either a black, red or yellow mother. Such a phenomenon would certainly be an extraordinary one, but it was exactly parallel to what took place with the exhibited species of Papilio.

Gen. Sir John Hearsey remarked that so long ago as 1831 he had captured Papilio Pammon and P. Polytes *in copulâ*, had killed the pair *in situ*, and so sent them to Prof. Westwood; in which position they were to be seen at Oxford to this day.

Mr. Waterhouse enquired whether there was any evidence of the fertility of the abnormal females, since on theoretical grounds it might almost be expected that they would be unproductive.

Mr. Wallace replied that he believed one of the abnormal females then exhibited could be seen to be full of eggs.

Prof. Westwood exhibited a butterfly recently received at the Oxford Museum from M. Snellen van Vollenhoven; the specimen was from Ceram, and it appeared to him to differ from Papilio Peranthus only in its large size and to some extent in its colouring; he found no structural difference whatever, and he begged to exhibit it as P. Peranthus, *var.*; it seemed to him to be precisely one of Mr. Wallace's "local forms," but Mr. Wallace informed him that *he* should describe it as a new species.

Mr. A. R. Wallace said that if structural difference was necessary to constitute a species, two-thirds, or probably nine-tenths, of the existing species must be abolished; the difference between a local form and a species was one of degree only, and in his opinion the butterfly exhibited possessed characters sufficient to entitle it to specific rank.

Prof. Westwood read the following descriptions of two new species of Phasmidæ:—

HETEROPTERYX HOPEI, *Westw.*

Lata, subdepressa, mesothorace conico; fulvo-lutea (viridis? dum viva), tegminibus opacis, pallide stramineis; spinulosa, spinis parvis, capitis vertice spinis octo coronato, mesonoto in medio partis posticæ spinis duabus minutis armato; parte detecta supera oviductûs segmento nono dorsali abdominis fere duplo longiori, elongato-lanceolata, angusta, sensim ad apicem attenuata, apice ipso furcato. (Fœmina.)

Long. corp. lin. 6; prothor. lin. 7; mesothor. lin. 9½; metathor. lin. 9; abdom. segm. 6 basal. lin. 27; segm. 3 apic. lin. 11; oviduct. lin. 6 = long. tot. circ. unc. 6½.

In Mus. Hopeiano Oxoniæ (Coll. Bell). Habitat ———?

Closely allied to H. Grayii, but much larger, though with the spines much smaller;

the tegmina and wings extend to the extremity of the second dorsal segment of the abdomen.

Phyllium Feejeeanum, *Westw.*

Parvum, læte viride, tegminibus fulvo-maculatis; capite et prothorace granulatis; abdomine subheptagono, lateribus segmentorum haud lobatis; femoribus anticis elongato-ovalibus, dimidio apicali marginis interni lobo semi-rotundo denticulato armatis; tibiis omnibus gracilibus; femoribus intermediis elongato-ovalibus, nec intus angulatis. (Fœmina.)

In Mus. Hopeiano Oxoniæ. Habitat Ins. Feejee.

Closely allied to and of the same size as P. lobiventre, but differs in the form of the abdomen and legs. The male is very slender, having the abdomen elongate-lanceolate, with the margins entire, and the terminal joints of the antennæ somewhat thickened.

Mr. S. Stevens exhibited a box of insects recently received from Mr. Diggles, of Moreton Bay, Queensland; they consisted principally of Lepidoptera, with a few Orthoptera, admirably preserved.

Mr. Sharp exhibited a single specimen of a beetle new to this country, the Stenus Kiesenwetteri, which he had captured at Wimbledon. The species appeared to be a rare one, but had occurred in Spain and in Bavaria.

Capt. Cox sent for exhibition some photographs of insects, the execution of which excited the admiration of all; they were very nearly, but rather under, the natural size.

The Secretary mentioned that the name of Sosxetra, proposed by Mr. F. Walker for a new genus of Hymenoptera (Chalcididæ), Trans. Ent. Soc. Ser. 3, vol. i. p. 370, must, according to the ordinary rules of nomenclature, be sunk, since the same author had, at p. 84 of the same volume, described a new genus of Lepidoptera under the same name.

Mr. Frederick Smith said that in stating the contents of the late Mr. Curtis's British Collection, in his Address to the Society at the last Anniversary Meeting, he had made a serious mistake. See 'Journal of Proceedings' for 1863, p. 198. The actual number of specimens was as follows:—Coleoptera, 9405; Lepidoptera, 7200; Hymenoptera, 7715; Diptera, 5878; Neuroptera, 1165; Hemiptera, 1673; Homoptera, 244 specimens.

The Rev. Hamlet Clark communicated extracts from a letter recently received from Mr. John Gray, who was collecting insects at the Cape de Verdes. The letter was partly written from the Island St. Nicholas, under date 22nd of February, 1864, and partly from Porto Grande, St. Vincent, 29th of February, 1864. Eight days had been spent in St. Nicholas, but as regarded Entomology the expedition was a failure; it was the mid-winter of that country, and more beetles could have been got out of any turnip-field on any Christmas-day in England than he had been able to procure there from the whole of the vegetation put together. Nevertheless a few nice beetles were captured—a handsome Dytiscus, a large tropical Gyrinus (Dineutes?), and eight or ten species of Harpalidæ, taken high up on the mountains (Nebria, &c.). Altogether, however, a list could not be made of more than twenty species, of which about five were Heteromera, several species of which were in profusion under every stone. There were no signs anywhere of abundant insect-life; nothing was seen upon the walls of the houses, nothing upon the flowers, nothing anywhere except the Heteromera under stones. A few fine spiders had been obtained, and carefully preserved in spirits.

Mr. Douglas C. Timins, under date of Cannes, March 29, 1864, communicated the following notes of his entomological observations made during the winter months in the Departement des Alpes Maritimes:—

"During the early part of November Papilio Podalirius and Gonepteryx Cleopatra appeared, though in small numbers. Cynthia Cardui and Vanessa Atalanta were extremely abundant, and continued on the wing throughout the winter. Orthoptera were very numerous in November and December: amongst them I noticed Acridium lineola, Gryllis maculata, G. azurea, G. Italica, G. cærulescens, &c., Mantis religiosa and others. Cicindelidæ were very abundant (the common C. campestris and C. hybrida, as well as several other species). In the beginning of December I took a great many specimens of Polyommatus Bœticus and the allied P. Telicanus: both these species fly round the tops of bushes, very much after the manner of the Theclas, between which genus and Polyommatus they form in habits, as well as in appearance, a connecting link. P. Unionalis appeared in fir-plantations and Lycæna Phlœas abounded everywhere, as did Lasiommata Ægeria, L. Megæra, L. Mæra, Argynnis Lathonia and Macroglossa Stellatarum. The larvæ of Papilio Machaon and P. Podalirius continued feeding until the middle of December, and this was also the case with numerous other species which in England assume the pupa state some three months earlier. During January few species of Lepidoptera were seen; Pieris Daplidice, however, appeared, and also *fresh* specimens of Colias Edusa and C. Myrmidone, and *battered* ones of Vanessa Io, V. Atalanta, V. Antiopa, V. Cardui and V. Urticæ. Examining moss appears to be of little or no use in this locality; probably the Coleoptera rarely hybernate in so mild a climate, and yet few were taken on the wing or crawling about, except Carabus monilis and Chrysomela Populi, and some of the genus Aphodius. This neighbourhood seems poor in Dytiscidæ, for I met with few, and these only the commonest species. In February the weather was extremely bad, and the only Lepidoptera which appeared were Lasiommata Ægeria, L. Mæra and Colias Edusa; early in March Papilio Podalirius reappeared and Gonepteryx Rhamni and G. Cleopatra also. During this month Colias Edusa, C. Myrmidone, Pieris Daplidice (very common), Anthocharis Belia, Vanessa C-album, V. L-album, Pontia Brassicæ and P. Chariclea, Thais Rumina, Thecla Rubi (very common), Polyommatus Alcon (?) and Saturnia Carpini appeared; also Vanessa Io and the other common Vanessidæ. Several species of Cicindelidæ occur now (March 24th) in the rocks, but I have not yet been able to identify them all; and of Libellulæ, Æshna grandis, Libellula forcipata, L. depressa, &c. A good many species of Hemiptera occurred in December and January, but I have been obliged to reserve their nomenclature for some future time, as I can obtain here no books on that order. Among the larvæ found in December were Deilephila Euphorbiæ, D. Galii and Acherontia Atropos. The pine woods have been full of the larvæ of one of the processionary moths, living in society under white silky nets, and proceeding in lines or chains, sometimes thirty feet long (each larva is hardly an inch and a half in length), to bury themselves preparatory to assuming the pupa state: on reaching a suitable place for this purpose, the chain of larvæ disperses, and each one proceeds to bury himself, usually, however, near his comrades, so that when one pupa was found by digging, more were certain to be obtained within a few inches of the same place."

Paper read.

Mr. Frederick Smith read a paper "On the construction of Hexagonal Cells of Bees and Wasps." This was illustrated by the exhibition of a collection of nests,

among which were those of Icaria guttatipennis, Nectarina Lecheguana, Tatua morio, Polistes tepidus, P. Tasmaniensis, Vespa vulgaris, Apis mellifica, &c.: among the most remarkable was a nest of Polistes Tasmaniensis, in which a single central cell had been prolonged and carried to a considerable distance above the level of the surrounding cells; this prolongation was alleged to be hexagonal, and much use was made of this in the course of Mr. Smith's argument. Mr. Bates, however, took issue with Mr. Smith on the hexagonality of this part, and declared it to be, in his opinion, as nearly circular-cylindrical as possible. In contradistinction to the "circular theory" expounded by Mr. Waterhouse at the previous Meeting, Mr. Smith's might be termed the "hexagonal theory," but it will give a better idea of the main argument, if we denote his view of the construction of the cells as the "intentional theory." The hexagonal form of cell was described as "the ground plan laid down by the Great Architect," and the bees were the builders who carried out his designs: it was argued that both bees and wasps began instinctively and with a primary intention to construct hexagonal cells; and so strong was the "hexagonal principle" guiding them in their operations, that one wasp, Apoica pallida, not only built hexagonal cells, but occasionally formed the entire comb of a hexagonal shape. Reference was also made to the artificial bases or foundations for cells used by the German bee-keepers, such foundations being hexagonal; and from this it was argued that these hexagonal ground-plans must be exactly such plans as bees were accustomed to erect their cells upon, or at all events that the fact of bees at once accepting the plan furnished them was strongly in favour of the supposition that bees when left to their own resources construct a precisely similar basement. In fine, Mr. Smith could not regard bees and wasps as creatures that would instinctively construct circular-cylindrical cells, but whose labours always eventuated in the production of hexagonal ones; on the contrary, he regarded them as creatures that would instinctively construct hexagonal cells, and the hexagons actually produced were only the carrying into effect the original intention of the builders.

Mr. Marshall (who was present as a visitor) asked Mr. Smith whether he thought a hexagonal foundation would be laid in a case where it was not in contemplation to form other cells in immediate juxta-position? or would a cell be hexagonal if there were no other cells adjoining to force it into that form? In his opinion, the hexagonal shape was due to the fact that there were other, as it were, competing cells around, and to the pressure of such competing cells on that whose form they thus determined: this also accounted for the fact that the exterior cells were circular. Competition and pressure were the causes of the hexagonal shape of the cell.

Mr. Newman enquired to what extent Mr. Smith would carry his principle of intention? Would he apply it equally to the case of the larva-cells of Microgaster alvearius? Was it applicable to the aggregation of lenses in the eyes of insects? or could it afford any explanation of the hexagonal form of pillars of basalt?

Mr. Waterhouse thought he had, in his paper, anticipated and answered most, if not all, of Mr. Smith's objections to the circular theory; he admitted, however, that the nest of Polistes Tasmaniensis presented a difficulty, but thought an isolated instance of unnatural formation was insufficient to overthrow the theory; he admitted also Mr. Smith's greater practical acquaintance with the nests of bees and wasps; but he considered the vice of Mr. Smith's paper to be that it overlooked or did not give sufficient attention to the circular marginal cells: according to the "intentional theory," the marginal cells ought to be as exactly hexagonal as the rest, but this was

not the case; it was upon observations of the marginal cells that the "circular theory" was grounded, and for their form, as well as for the hexagonal form of the surrounded cells, the circular theory accounted, whereas the intentional theory of Mr. Smith applied to the central cells only, and left the other case entirely unexplained. At any rate the two theories were before the Society, and he hoped the two papers would be published together, so that Members, caring naught for either theory as such, might impartially draw their conclusions for themselves.

New Part of the 'Transactions.'

A new Part of the 'Transactions,' Series 3, Vol. i. Part 9, being the concluding part of the volume, and the first published during the present year, was on the table.

May 2, 1864.

F. P. Pascoe, Esq., President, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Mémoires de la Société de Physique et d'Histoire Naturelle de Genève,' Vol. xvi. Parts 1 and 2; Vol. xvii. Part 1; presented by the Society. 'Proceedings of the Royal Society,' Vol. xiii. No. 61; by the Society. 'Journal of the Proceedings of the Linnean Society,' Vol. vii. No. 28; by the Society. 'Notes on Sphærularia Bombi,' by John Lubbock, Esq., F.R.S., Pres. Ethn. Soc.; by the Author. 'Sitzungsberichte der Königl. bayer. Akademie der Wissenschaften zu München,' 1863, II. Heft iv.; by the Academy.' 'The Journal of Entomology,' No. 8; by the Proprietors. 'The Journal of the Society of Arts' for April; by the Society. 'The Reader' for April; by the Editor. 'The Zoologist' for May; by the Editor. 'Stettiner Entomologische Zeitung,' 1864, Nos. 4—6; by the Society. 'Descriptions of New Genera and Species of Phytophaga,' by J. S. Baly; by the Author.

Exhibitions, &c.

Mr. Dunning (on behalf of Mr. R. S. Scholfield, who was present as a visitor) exhibited a specimen of Hydrilla palustris, captured by Mr. Scholfield in Quy Fen, Cambridgeshire; the specimen was a male, and was disturbed from grass on the afternoon of the 29th of May, 1862. This Noctua was introduced into the British List on the authority of an example in the possession of Mr. Allis, taken some years ago near York; but the species was not included (or rather was given as a "Reputed British Species") in Mr. Doubleday's 'Synonymic List of British Lepidoptera' (ed. 1859).

Captain Cox exhibited various coloured drawings of Lepidopterous larvæ; and the original of his "larva-index" or "larva-dictionary," the plan of which was described by him at a recent Meeting of the Society. (See 'Journal of Proceedings' for 1863, p. 186.)

Captain Cox also exhibited a number of Lepidopterous larvæ which had taken possession and were consuming the contents of a large bin of bran; in the previous year he had found Aglossa pinguinalis extremely abundant in his stables and outhouses, and hence thought it probable that the larvæ were of that species; it was,

however, remarkable that the larvæ of so fat and greasy a moth should be nourished on so dry a substance as bran. Mr. Dunning thought the larvæ were more probably those of Pyralis farinalis; and Mr. Newman suggested Hithyia sociella.

Prof. Westwood exhibited nine species of Charaxes (three of which were unique specimens) from the Zambesi, whence they had been sent by the Rev. H. Rowley; each specimen was placed in a separate envelope, a considerable number might thus be placed in a box, and the whole had travelled in this manner without sustaining material injury.

Mr. A. R. Wallace exhibited various species of Papilio, Eronia and Pieris, with the intention of showing the effect of locality in producing change of form in insects. Numerous species inhabiting the island of Celebes were produced, and in each case in juxta-position therewith was its nearest ally from the adjoining islands. The Celebes insects, in every instance exhibited, had the costa of the anterior wings much more strongly arched than was the case with their congeners with which they were compared. Mr. Wallace remarked that changes in colour which were due to locality had been frequently noticed, but of instances of a change of form only few had been recorded; Mr. Bates, however, had mentioned some as having come under his observation in South America. In the Eastern Archipelago, he (Mr. W.) had found that the butterflies inhabiting the islands which formed the eastern half were generally larger than those in the western half; and, especially in the Papilionidæ, that Celebes and Amboyna produced the largest specimens. Some species which in India were found with a large tail appended to their hind wings, possessed only a small tail in the Indian Islands, which ceased altogether or was reduced to a mere tooth in the islands of the Pacific; of this Papilio Agamemnon was an example. The island of Celebes was as nearly as might be the centre of the Eastern Archipelago, and the butterflies of that island, especially the Papiliones, possessed the peculiarity in the form of their wings to which he had invited attention; sixteen or seventeen species of Papilio were found in Celebes, and, with a single exception to be afterwards noticed, all were distinguished from their allies in the other islands by having the upper wings strongly arched, in lieu of a gentle and gradual curve, or, if he might so term it, a flat bend. The same distinction existed also in many Pieridæ and in a few Nymphalidæ, but he had not observed it in other groups of butterflies. Mr. Wallace had a theoretical explanation to offer of this phenomenon; he conceived that the insects had become modified in form by the external circumstances to which they had been subjected, and that this modification was to be accounted for by some physical or organic change which had occurred in Celebes, but not in the now adjacent isles. Rapidity of flight was generally supposed to be the consequence or a property of the falcate form of wing; he (Mr. W.) was inclined to think that the falcate form gave greater facility in twisting or turning about; if that were so, the Celebes form of butterfly-wing would give the insect this additional facility, and thus enable it more easily to escape from its enemies. If, then, the Celebes insects were supposed to have been formerly subject to great persecution, those with the arched form of wing would have the best chance of escaping, the less favoured forms would be gradually killed off, those that survived would owe their existence to the form of their wings, their offspring would resemble and some few would exceed them in the possession of the advantageous shape, and the specimens with the best developed wings being naturally selected in each succeeding generation would lead to the gradual and regular increase of the peculiarity. But then it might be asked, How is it that only a few of the butterflies have the peculiarity in question?

The answer was, that different insects preserve their existence by different means; one may escape by means of its power of flight, the habits of a second may enable it to avoid its foe, a third may owe safety to its colour, whilst a fourth may be positively distasteful to animals which prey upon insects. Thus the Danaidæ, though slow of flight, were very abundant and were the subjects of mimicry or imitation by other species; in all probability they owed their immunity from destruction to the strong and unpleasant odour which they indubitably possessed. It was manifest that where another means of escape already existed, the principle of selection would not be brought into play; the peculiar form of wing would not be wanted, and therefore would not be acquired. The obscure Satyridæ were doubtless protected by their colour; the majority of the Nymphalidæ had already sufficient power of flight, and those of that group which had acquired the arched form of wing were precisely the species which possessed only about the same power of flight as a Papilio. The single Celebesean Papilio which had not assumed the arcuate form of wing was one belonging to the Polydorus group, a group which was itself imitated by other Papiliones, and which therefore was doubtless provided with some special defence, though the nature of it was unknown to us.

Prof. Westwood, after remarking upon the pleasure he always derived from Mr. Wallace's speculations, whether he agreed with them or not, said that he was unable to follow Mr. Wallace in tracing the phenomenon to the causes assigned by him; arched wings were not necessarily, or even generally, accompanied by the greatest rapidity of flight; and if the original form of the butterfly must be varied, if one species must imitate another, he (Prof. Westwood) thought it far more probable that the variation would consist in getting stronger muscles to their bodies, as in the species of Charaxes he had that evening exhibited, rather than in a minute change in the curve of the wing.

Captain Cox thought that the swiftest fliers had the straightest wings, as, *e.g.*, the Sphinges, where the costa was scarcely arched at all.

Mr. Newman also was unable to connect an arcuate wing with rapidity of flight, and instanced the straight costæ of the swift-flying Diptera.

Mr. F. Smith referred to some of the swiftest Hymenoptera, which had pointed wings, but with perfectly straight costæ.

Mr. Baly said that the arched form of wing might be advantageous in giving a greater power of twisting and turning about, rather than in giving greater rapidity of flight; and this, he thought, was what Mr. Wallace had suggested.

The President observed that the theory seemed to be based upon the supposition of a gigantic persecution to which the butterflies had been subject; but was there any evidence of the existence of such persecution? had Mr. Wallace ever seen the insects actually pursued by birds or other enemies? It seemed to him that persecution, to the extent to which it now occurred, was altogether inadequate to account for the magnitude of the result attributed to it.

Mr. Bates said that he had frequently observed in South America that the paths were strewn with the wings of butterflies; and in this country it was not an uncommon sight to see the Pontiæ pursued by birds, and sometimes escaping by means of their tortuous or "dodging" flight.

Captain Cox had recently seen forty or fifty specimens of Brephos notha destroyed by tom-tits in a single morning.

Mr. F. Smith remarked that, on the persecution principle, great change must be impending in the shape of wing of the butterflies of the London district.

Prof. Westwood asked whether Mr. Wallace had observed the twisting or "dodging" flight to be conspicuous in the butterflies which have largely-developed wing-tails? or whether the tails contributed to or affected the flight in any, and, if any, in what manner?

Mr. Wallace replied that he had not observed that the wing-tails had any influence upon the flight of the insect; he did not think they affected the rapidity, or that they acted as a rudder, and he was at a loss to assign any use to those appendages. With respect to the other points which had been touched upon, there was in some cases an increase of muscular power as well as an increase of curvature of the wings, but the wing of a butterfly was far more liable to variation than the body of the insect; that organ was therefore more accessible to the operation of the principle of selection, and a modification of its form was consequently more readily produced. Most of the instances of swift-fliers with straight wings which had been adduced (as *e.g.* the Sphinges) were insects with the strongest bodies and the greatest muscular power; moreover, he did not maintain that any insect with arched wings would have a more rapid flight than any other with straight wings; all that he had argued was, that, as between two closely allied species, the one which had the wings most arched would have the flight most rapid; for instance, he should expect a Sphinx with arched wings to fly more rapidly than a Sphinx with straight wings. But in truth, though he had referred to the supposed concomitancy of falcate wings and a rapid flight, his own notion was (as had been correctly stated by Mr. Baly) that the arched form was chiefly useful in giving greater power of turning or twisting. As to the enquiry whether he had seen the butterflies actually pursued, he admitted that he had not to any great extent; he offered his explanation as a theoretical one; but he thought it could scarcely be doubted that butterflies were subject to the attacks of numerous depredators.

Paper read.

The Secretary read a paper, "On the Reversion and Restoration of the Silkworm," by Captain Thomas Hutton, F.G.S., of Mussooree, N.W. India.

The author attributed the enormous loss of silkworms by "muscardine" and other diseases, and the consequent diminution of the crop of silk, to the combined effects of bad and scanty food, want of sufficient light and ventilation, too high a temperature, and constant interbreeding for centuries of a debilitated stock. He asserted that there was no such thing now in existence as a perfectly healthy domesticated stock of silk-worms; and moreover, that it was useless to seek for healthy seed, for whether in Europe, Persia, India or China, the worms were all equally degenerated, or, if there were a difference at all, it was in favour of the European race. He had for several years been experimenting upon Bombyx Mori, with a view, if possible, to reclaim the worms, to restore to them a healthy constitution, and to induce them to *revert* from their present artificial and moribund condition to one of vigour and permanent health. The occasional occurrence in a brood of one or more dark gray or blackish-brindled worms—the "vers tigrés" or "vers zébrés" of the French—contrasting strongly with the pale sickly hue of the majority, must have been noticed by all who have had experience in rearing silkworms; such occurrences have been always spoken of as indicating variety arising from domestication. The author had endeavoured, by a series of experiments, to ascertain the cause of this phenomenon, his conviction being, either that the species had at some time or other been crossed by another of different colours, and that Nature, as sooner or later she always would do, was making an effort

to separate them, or that the original colour of the worm had been dark, and an effort was being made to *revert* from a sickly condition to the original healthy starting-point. He accordingly picked out all the dark-coloured worms and reared them separately, allowing the moths to couple only *inter se*, and the same with the white worms. In the following spring the one batch of eggs produced nearly all dark brindled worms, whilst the other batch produced white worms, sparingly interspersed with an occasional dark one; these latter were removed into the dark batch, which was also weeded of its pale worms. In the third year the worms were still darker than before, and were always larger and more vigorous than the pale ones, giving larger and better-stuffed cocoons. Just as the eggs of the third year had been collected, a violent gale of wind upset the whole, but in the spring of 1862 the author recommenced *de novo*, and went over the same ground again. The few dark worms picked out escaped disease altogether, though reared in the same manner, in the same room, in the same temperature, on the same quality of food as, and in close contiguity with the others. In due time they spun cocoons, and produced moths, which, coupling *inter se*, deposited a fair stock of eggs, with which the experiments were continued in 1863. The eggs began to hatch on the 16th of March, and no sign of disease was apparent until the moths came forth, when many still showed defects in the malformation and dark spotting of the wings. As compared, however, with the previous year there was decided improvement; still there were too many white worms in the brood, but there was no symptoms of disease, the worms attained a larger size by a quarter of an inch and produced larger cocoons, and the moths laid good-sized eggs, great numbers of which adhered firmly to the paper upon which they were deposited, and many of the male moths displayed unusual vigour in flying in search of the females. But still more extraordinary was the fact that some of the eggs of Bombyx Mori of the spring crop of 1863 began to *hatch again for a second crop* on the 7th of August; these were all of the dark stock. The hatching continued throughout August, and occasionally even to the 23rd of September, when, through fear that the supply of leaves might fail, the eggs were removed to a temperature below 70° Fahr., in order to check the hatching. The worms which were then hatched throve and spun good cocoons, superior in size to those of the spring crop; in due time the moths appeared and were fully twice as large as those of the spring, depositing large well-formed eggs. In the beginning of December, to the author's dismay, more worms were hatched from the spring batch, and they continued to come forth at the rate of forty or fifty daily in a temperature of 53° Fahr., until, there being no more leaves upon the trees, the remaining eggs were placed in the open air at night, in order that the hoar frost might put a stop to further hatching. The whole of these worms were of the dark kind, and no white ones appeared amongst them as in the spring. This circumstance, so unusual with Bombyx Mori, the author attributed entirely to an accession of health and strength in the black worms; he regarded the occasional occurrence of the dark form in domestication as an attempted return on the part of Nature to the original colours and characteristics of the species, and considered the whiteness of the generality of the worms as a positive indication and proof of the destruction of the original constitution; in fact, the dark worms were the original and natural worms. This conclusion was further supported by arguments deduced from the strong similarity in the disposition and arrangement of the markings to those of the existing wild races in India, and by analogy to the general fading in domestic stocks of the original colour, to give place to piebald and finally to white. The author had long

entertained the idea that the production of white cocoons (except in those cases where the white was permanent and constant in all climates) was a strong sign of degeneracy, the white cocoons being more abundant where the temperature was high than in more temperate climes; the whiteness of the worms and the white cocoons were both indications of failing constitution, evidencing the existence of a higher temperature and more artificial treatment than was conducive to the health of the insect. The author proceeded to argue that the good quality of the silk produced was no proof of the general health of the insect; it was the quantity, rather than the quality, of the silk that was affected by the present maladies; too great fineness of the silk was, in fact, an indication of too high a temperature, and of the consequent degeneracy of the worm. After considering at some length the question "What species of mulberry-tree is best adapted for the nourishment of the silkworm and for the production of good silk?" the author concluded by recommending the sericulturist to separate his dark worms from his general stock, to set them apart for breeding from, and to annually weed out all the pale-coloured worms; in the course of three or four years he would be able to cast aside his present sickly stock, and would have a stock far healthier than had ever before been seen in Europe.

June 6, 1864.

H. T. Stainton, Esq., V.P., in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'The Journal of the Royal Agricultural Society of England,' Vol. xxv. Part 1; presented by the Society. 'Verhandlungen der Kaiserlich-Königlichen Zoologisch-botanischen Gesellschaft in Wien,' Band xiii.; by the Society. 'Monographie der Oestriden,' von Friedrich Brauer; by the Author. 'The Transactions of the Entomological Society of New South Wales,' Vol. i. Part 2; by the Society. 'Histoire Naturelle des Araignées (Aranéides)' par Eugène Simon; by the Author. 'Sitzungsberichte der Naturwissenschaftlichen Gesellschaft Isis zu Dresden,' Jahrgang 1863; by Herr L. W. Schaufuss. 'The Zoologist' for June; by the Editor. 'The Intellectual Observer,' Nos. xxviii. and xxix.; by the Publishers. 'The Journal of the Society of Arts' for May; by the Society. 'The Athenæum' for April and May; by the Editor. 'The Reader' for April; by the Editor. 'The Entomologist's Monthly Magazine,' No. 1; by the Editors. 'The Entomologist,' Vol. ii. Nos. 1 and 2; by the Editor.

Election of Member.

Edward Revett Sheppard, Esq., of Rutland Lodge, Lee Park, Lee, was balloted for and elected a Member of the Society.

Exhibitions, &c.

The Secretary exhibited some leaves of the sugar-cane from Mauritius, with numerous specimens upon them of an insect (a species of Coccus) which had lately committed great ravages among the plantations of that colony: they had been sent to

him by Mr. James Morris, the representative in this country of the Mauritian Chamber of Agriculture. Mr. Morris (who was present as a visitor) said that the insects had attacked the young leaves as soon as they came out, both in Mauritius and Réunion; they had never been noticed before, and were supposed to have been introduced into the islands from France or Belgium. The sugar-growers were very anxious to hear of some remedy; the employment of children to pick the insects off and destroy them had been suggested, and the use of sulphur, which had been successfully applied for the vine-disease, had also been recommended. They had formerly suffered considerably in Mauritius from the borer insect (*Diatura Sacchari*), and in some quarters the injury was still continued; but at his (Mr. Morris's) suggestion, some of the planters dipped the heads of the canes, before planting, in a weak solution of carbolic acid very much diluted in water, and it was found that the canes grew vigorously and were not attacked by the borer.

Prof. Westwood remarked that the use of sulphur for the vine-disease had certainly produced a most beneficial result; the application of carbolic acid, which had proved successful with the borer, ought to be tried as a preventative of the attacks of the Coccus; the young plants might be washed with the solution, but to get rid of the insects when once they had settled upon the plants he apprehended that a manual application would be required.

Mr. Bates asked whether there was any destroyer of Cocci which could be readily imported. It would be difficult to organize an immigration of Coccophagi (Chalcididæ).

Mr. F. Smith exhibited some singularly elaborate and beautifully coloured drawings of Lepidoptera belonging to Mr. W. S. Atkinson, of Calcutta, and executed by Indian artists; among them were the sexes of Epicopeia Polydora, exhibiting peculiar variation in the form of the hind wings, and the rare Calinaga Buddha, *Moore*.

Mr. F. Smith also exhibited a British female specimen of a Bombus which was unknown to him; it was captured by his son on Deal Sands; the head resembled that of B. hortorum, whilst the rest of the insect was like B. Lapponicus; he had as yet been unable to determine the species.

Mr. F. Smith also exhibited a series of six wasps' nests of most singular construction, belonging to Mr. Stone, of Brighthampton; each was built in a cubical wooden box, and all were of different and fantastic shapes, one being an imitation of a stalactite cave, whilst another not inaptly represented Stonehenge. The whole of the series had been executed by the same colony of Vespa germanica, without a queen, in thirty-eight days of September and October, 1862; No. 1 of the series was completed in two days, No. 2 in four days, No. 3 in seven days, No. 4 in fifteen days, No. 5 in five days, and No. 6 in five days. He had only that day received the nests, with a letter from Mr. Stone, of which the following was an extract:—"Of these nests I may remark that the extraordinary thing is that one set of wasps should have executed the entire series, and also the very short space of time in which some of the specimens were completed. The fifth and sixth of the series are certainly very extraordinary productions. In the roof of these examples the arrangement of the cones is beautifully shown." Mr. Smith hoped before the next Meeting to obtain information from Mr. Stone as to the means employed to compel or induce the wasps to make these abnormal constructions.

Mr. F. Smith read the following further extract from Mr. Stone's letter:—

"The present season bids fair to be a more favourable one for our favourite Order than any one since the disastrous year 1860. I think I never saw the commoner species of Bombi so plentiful. Wasps, too, are in great force, and they commenced their

labours at an earlier period than I ever knew them do before. I took out of a chamber I had formed the year before, and attached to a peg I had then inserted, a small nest of Vespa germanica so early as the 23rd of April last, and up to the present time I have removed from chambers I formed this spring fifteen nests of various species and of various sizes. I have one of V. germanica at work in a window of the house: from this nest I am in daily expectation of seeing young wasps emerge.

"Two years ago I brought home two nests of V. sylvestris, which produced a vast number of young females in the autumn of that year. Last year none of the females of this species were observed here, but this year they abound. This goes to confirm the opinion you have expressed, and in which I agree, that female wasps occasionally remain more than one winter in a torpid state, after leaving the nest in which they were bred."

The Secretary read the following, which had been communicated by a gentleman residing near Chichester:—

"If you have no statistics of the occasional visitations of wasps in unusual numbers, perhaps the following notes may interest the enquirers into such matters. I have been a wasp-destroyer for many years, and to that end have paid for all queen wasps taken in the months of April and May, and destroy all nests found during the year. The queens appear when the gooseberry blooms and the hawthorn hedges begin to be green. In some years large numbers have been obtained, and, if my accounts are at all a true test, there have been very few queens in some seasons, and in others not enough to repay an idle boy for the trouble of collecting them. As the breed of wasps is said to be dependent in some measure on the weather in the previous autumn and winter, I have appended a few weather remarks in connection with the wasp reports.

1836. Previous autumn wet, early spring wet, yet 123 dozens of queens were collected.

1837 and 1838. Scarcely any wasps, only 3 dozens of queens in 1838.

1839. Much wet in the previous autumn, but spring rather dry: 287 dozens of queens.

1840. Much wet in the previous autumn, the spring rather dry: 73 dozens of queens.

1841. Cold and severe January, and about an average quantity of rain in the spring, but queen wasps abounded to a very great extent: 586 dozens of queens collected. No account of nests afterwards.

"No report of wasps taken for some years, but it is supposed that they were scarce here, or the boys would have been anxious to earn their pence.

1852 and 1853. Very wet, consequently against the breed of such insects. No queens paid for.

1854. The four months, July to October, in 1853, very wet, but the spring of 1854 dry. No queens recorded as paid for, but the nests of wasps were very early, very strong and remarkably abundant: nearly 100 nests were destroyed within a few hundred yards of the homestead. The year 1854 was one of the driest on record, and it was also remarkable for the almost total destruction of hops by blight. Were the wasps sent to destroy or stay that evil? They are great enemies to all insect life. In this year I was attracted by the wasps

collecting on the stems of some stunted silver-firs where the bark had been rubbed off in former years: on examination I observed that these spots were inhabited by some specimens of the Aphis tribe, large and rather light coloured: they exuded very large drops of their fæces, and this was the attraction to the wasps, who became gorged or drunk with it, so as to prevent them from getting out of the way of the foot which crushed a dozen at once. What species of Aphis was it likely to be?

1855. The spring of this year also very dry, but no wasps are recorded as paid for.

The years 1856 and 1857 were moderate as to rain, and 1858 was a very dry year. In 1857 there were 144 dozens of queens and in 1858 94 dozens paid for.

No record of 1859, but 1860 was a year of wet and gloom: no queens and no nests.

In 1861 no queens collected, and only 21 dozens in 1862.

In 1863 no queens collected and very few nests to be found; there were some very strong nests, but all known ones were destroyed.

Yet now, on the 20th of May, there have been brought in above 250 dozens. Where do they come from after such a season of their scarcity as 1863?

"My house is not very far distant from long tracts of wood, on the edge of the southern slopes of the South Downs."—W. L. W.

Mr. F. Smith enquired what was the object of destroying all the queens? Surely such immense visitations of wasps did not occur without there being some important function which the insects were sent to perform.

Mr. Tegetmeier mentioned a novel instance of intelligence and prevision in the honey-bee. When a tenantless hive with empty combs is left in an accessible situation, it frequently happens that bees will visit it and clear out the refuse, and that a swarm will then take possession of it; but it has not been previously recorded that the bees will secrete wax in a tenantless hive for the purpose of repairing the injured combs and of fastening them more securely to the roof and sides. Being desirous of stocking a moveable frame hive with a swarm that was expected to come off early in May, Mr. Tegetmeier secured an empty comb in each frame and placed the hive alongside the stock from which the swarm was expected to issue. The bees from that stock immediately visited the empty hive, and carried out fragments of loose comb; on raising the hive after it had been thus visited for a few days, he observed newly-secreted scales of wax on the floor-board; and on careful examination he found that a considerable quantity of new white wax had been secreted, and used for the purpose of securely attaching the combs to the wooden frames. The difference between new and old wax was so great as to preclude the possibility of one being mistaken for the other; and hence Mr. Tegetmeier could only conclude that the bees, with the intention of taking possession of the empty hive, had assembled in it in considerable numbers and clustered together to secrete wax, which they had then employed to strengthen the attachments of the combs, so as to enable them to bear the weight of the honey, bee-bread and brood, with which the cells would be filled shortly after a swarm should take possession of the hive.

Mr. Tegetmeier also said that about two years ago he had brought under the notice of the Society the fact that bees in the perfect state were in the habit of eating pollen or bee-bread, which was previously supposed to be collected solely as food for the larvæ; during the present year he had obtained indubitable proof of the consumption

of pollen by the bees themselves, having captured several in the very act of eating it on the alighting-boards or entrances to the hives. Microscopical examination showed that in each instance the stomach was filled with pollen-grains; and Mr. Tegetmeier thought there was no good ground for suspecting that the pollen thus eaten was afterwards disgorged with the honey in the stomach as food for the larvæ.

Mr. M'Lachlan exhibited a case-bearing larva which had been found by Mr. Douglas at Box Hill, apparently feeding on wild thyme. Prof. Westwood was of opinion that it was a larva of the Coleopterous genus Clythra.

Mr. Bates read the following extract from a letter recently received by him from Mr. Roland Trimen, of Cape Town:—

"I have just noticed a very remarkable instance of close imitation of a flower by a spider. Leptoneura Clytus, a handsome Satyrus, is very abundant here just now. Flowers are rather scarce at this season, and a tall straggling plant with yellow composite flowers attracts these butterflies, with many other insects. As I approached a plant upon which were several Clytus, I observed that two specimens did not fly off with the others, and found that each was in the clutches of a bright yellow spider. I removed one of these butterflies, and as the spider shrunk up its limbs on the flower, which it equals in size, it was scarcely distinguishable, so exactly similar was it in colour. But it was after this that it assumed its astonishing likeness to the flower. Recovering from its alarm (I suppose), it slowly moved to the side of the flower, and, holding on to the stalk by its two hindmost pairs of legs, extended the two front pairs upwards and laterally. In this position it was scarcely possible to believe that it was not a flower seen in profile, the rounded abdomen representing the central mass of florets, and the extended legs the ray-florets, while, to complete the illusion, the front femora, appressed to the thorax, have each a longitudinal red stripe which represents the ferruginous stripe on the sepals of the flower! As the other spider also assumed the same attitude when robbed of his butterfly, and as both retained it for a considerable time (I left them so), I conclude that it is their ordinary mode of waiting for their prey. I enclose the flower, and shall be glad to hear its name."

Mr. Bates added that the flower was the Senecio pubigerus of Linnæus, a very common road-side weed in dry ground, &c., about Cape Town, and the spider belonged to the genus Salticus; he considered this case of mimetic resemblance peculiarly valuable, since the purpose or object of the imitation was so plainly manifest.

Major Parry sent for exhibition a male specimen (var. minor) of Odontolabis Stevensii, the left antenna of which was trifid from the third joint, having three distinct clavæ, whilst the right antenna was bifid from the extremity of the basal joint; one of the latter limbs appeared to have been fractured, and in consequence the right antenna did not exhibit two perfect clavæ. Major Parry communicated the following note:—

"I beg to submit to the Meeting a brief account of an extraordinary and interesting case of monstrosity produced in the antennæ of Odontolabis Stevensii, one of the Lucanoid Coleoptera, the right antenna being furcate from the apex of the basal joint, whilst the left one exhibits a bifurcate process, issuing from the third joint, that is to say, the former being abnormal from the basal and the latter from the third joint; the left antenna, moreover, possesses three distinct clavæ, the right one being in this respect in its normal state, exhibiting, however, the partial development of a second one. In

regard to the malformation of the right antenna as exhibited in the present instance, an exactly similar case was remarked by M. Buquet in another Coleopterous insect belonging to the Buprestidæ (Julodis Clovei, from Abyssinia), and notified by that gentleman in the Ann. Soc. Ent. Fr., accompanied by a figure (Ser. 2, vol. i. pl. iv. [iii.], fig. 1). It is in vain, I think, to suggest any cause for such an extraordinary freak of nature, and I must therefore content myself with merely recording the fact."

Mr. Stainton exhibited the pupa of Anchinia verrucella, one of the Tineina, which in its angular form, and mode of suspension from its tail and by means of girths round the body, resembled the pupa of a Pieris.

Dr. Alexander Wallace exhibited specimens, sent him by M. Guerin-Meneville, of the silk produced by Bombyx Cynthia fed upon the Ailanthus; the specimens included silk carded from the cocoon, spun silk, woven silk, and a skein of Ailanthine spun from the cocoon in one continuous thread. Dr. Wallace said that he was engaged in a series of experiments with a view to the introduction into this country of the cultivation of the wild silk-worms, from which it was hoped that the deficiency of the supply of the silk of Bombyx Mori might be made up; he had planted a railway-embankment near Colchester with the Ailanthus, which was found to be very hardy, and he had preserved larvæ of B. Cynthia through a temperature of 32° Fahr.

Prof. Westwood expressed a fear that an out-door colony of silk-worms would not succeed in this country so well as M. Guerin-Meneville's; the existence of small birds, which were practically extinct in France, would make a great difference in the result of the experiment.

Mr. Newman remarked, with reference to the alleged deficiency of silk, that there was no dearth of that article, that the English and French markets were overstocked, and that silk which five or six years ago was worth thirty shillings a pound was now not worth more than twenty-two shillings a pound.

Prof. Westwood said that, however that might be, the quantity of silk produced in France was diminished by one-third; and Dr. Wallace added that in many parts of France the mulberry was being destroyed, and the vine planted in its stead.

Prof. Westwood exhibited some extremely minute Acarideous insects, which he had received from Mr. Chapman, of Glasgow, who had observed them in vast numbers infesting the unopened buds of black currant trees, which they entirely destroyed by withering up the embryo blooms. These creatures, almost invisible to the naked eye, were of an elongated oval form, with an oval head and two pairs of short legs porrected in front of the body, the penultimate joint of each emitting a long bristle; the extremity of the body was obtuse, and also emitted two bristles, and the body itself was marked with very numerous transverse rows of minute dark dots. These creatures were also found dead in vast numbers on the inner surface of the sheathing-leaves of the dried-up buds. On one of the diseased buds were also found several specimens of a full-grown Acarus belonging to the genus Nothrus, and evidently forming a new species distinct from any figured by Koch. The genus, or rather subgenus, Nothrus forms part of the group Oribata, but Prof. Westwood was inclined to believe that the minute creatures were not the young of the Nothrus, but of some species of Tetranychus, some of the species of which are found upon trees, spinning extensive webs, as is the case with T. telarius. The only other recorded instance of a four-legged state of individuals among the Acaridæ occurred in the closely allied form figured by Dugès in the 'Annales des Sciences Naturelles,' 2nd series, vol. ii. pl. II. A, under the name of the "Acarien du galle de Tilleul," found in galls on the leaves of the lime-tree,

which, from the structure of its palpi, mandibles and legs, M. Dugès was inclined to refer to the neighbourhood of Tetranychus. In every other recorded immature state of Acaridæ the animals possessed six legs. The question of the introduction of such great numbers of these minute creatures within the closely-packed leaves of the currant buds was difficult of explanation, but Mr. Stainton suggested that the eggs had been introduced into the immature buds in the previous autumn.

Prof. Westwood also exhibited a remarkable new species of butterfly from East India, which, although presenting all the general appearance of a species of the Brazilian genus Brassolis in its robust body and wings and in the coloration of the latter, belongs to the Lycænidæ, having the veins of the fore wings arranged as in Amblypodia Timoleon. The following are its characters:—

Genus Liphyra, *Westw.*

Corpus breve, crassum. Caput mediocre, oculis magnis. Palpi minuti, obliqui, suprà vix visibiles, articulo ultimo ovali, apice acuto. Antennæ rectæ, dimidio apicali sensim clavatæ. Pedes valde abbreviati, crassi, omnes sex æquales, perfecti, tibiis omnibus ecalcaratis; tarsorum unguibus integris, nec bifidis, pseudonychiis conicis, pulvillo subbilobato. Alæ magnæ, obtusæ, ecaudatæ; anticarum vena posteostali 4-ramosa, ramis duobus ante apicem cellulæ discoidalis, alterisque duobus æquidistantibus inter cellulam et apicem, cellula clausa; posticarum margine costali angulato, cellula in angulum acutum terminata.

Liphyra Brassolis, *Westw.*

L. fusca; alis anticis nigris, plaga magna hastata interno-basali, maculaque subquadrata parva discoidali fulvis; alis posticis fulvis, limbo maculisque quatuor parvis disci nigris.

Expans. alar. unc. 3¼.

Habitat Assam (Jenkins), Singapore (Horsley).

In Museo Hopeiano Oxoniæ.

Paper read.

Mr. Francis Walker communicated a paper entitled "Descriptions of undescribed Chalcidites." The whole of the species belonged to the genus Smicra, were discovered by Mr. Bates in the Amazon country, and are now in the collection of the British Museum.

July 4, 1864.

A. R. Wallace, Esq., V.P., in the chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Proceedings of the Royal Society,' Nos. 62, 63 and 64; presented by the Society. 'Journal of the Proceedings of the Linnean Society,' Vol. viii. Botany, No. 29; by the Society. 'The Journal of Entomology,' No. 10; by the Proprietors. 'Catalogue of the Coleopterous Insects of the Canaries in the Collection of the British Museum,' by T. Vernon Wollaston, M.A., F.L.S.; by the Author. 'A Treatise on Insects

injurious to Gardeners, Foresters and Farmers,' by Vincent Köllar: translated from the German, and illustrated by engravings, by J. and M. Loudon, with Notes by J. O. Westwood, Esq., F.L.S., &c.; by James Bladon, Esq. 'Sitzbungsberichte der Königl. bayer. Akademie der Wissenschaften zu München,' 1861, I. Heft. 1, 2; by the Academy. 'Exotic Butterflies,' Part 51; by W. W. Saunders, Esq. 'Horæ Societatis Entomologicæ Rossicæ variis Sermonibus in Rossia usitatis editæ,' Fasciculus secundus; by the Entomological Society of Russia. 'The Intellectual Observer,' No. xxx.; by the Publishers. 'The Zoologist' for July; by the Editor. 'The Entomologist,' Vol. ii. No. 3; by the Editor. 'The Entomologist's Monthly Magazine,' No. 2; by the Editors. 'Stettiner Entomologische Zeitung,' Vol. 25, Parts 7—9; by the Entomological Society of Stettin. 'The Journal of the Society of Arts' for June; by the Society. 'The Reader' for June; by the Editor. 'The Athenæum' for June; by the Editor.

The following addition by purchase was also announced:—'Entomographie de la Russie,' par Gotthelf Fischer. Tomes 1—3.

Exhibitions, &c.

Prof. Westwood directed attention to a paper in the second part of the 'Horæ Societatis Entomologicæ Rossicæ' on the parasites of bats: not only were several species of Pulicidæ and of Nycteribia enumerated, but also species allied to the latter, yet differing so much in structure as to necessitate the creation of new genera (or sub-genera); he might remind the members present of the extraordinary mode of transformation of Nycteribia, the larva state being passed within the egg, which was not extruded from the body of the female until after the pupa state had commenced.

Mr. A. R. Wallace mentioned that he had found Nycteribiæ in the tropics, but not in large numbers, though probably a sufficient examination would show that each species of bat was infested with its own peculiar species of Nycteribia.

Mr. Tegetmeier exhibited one of the frames from the bee-hive, mentioned in the minutes of the previous Meeting, in which wax had been secreted for the purpose of repairing the old comb and fastening it securely, with a view, as he thought, to future occupation of the hive. He added that the expected swarm had not taken possession, for the recent cold weather had killed the young queens, and the hive from which had issued the bees which did the repairs had not swarmed at all.

Mr. A. R. Wallace inquired what evidence there was of any purpose or design of taking possession of the empty hive? Had not the bees simply obeyed a mere impulse to make wax?

Prof. Westwood asked whether it was certain that there had not been a "false swarm," or that the queen had not been accidentally killed? If Mr. Tegetmeier's hypothesis were true, that the bees, without a queen, had repaired the old combs with the intention of taking possession of them, how was the swarm to compel the queen (who was commonly supposed to lead the swarm) to carry out their design and enter the repaired hive?

Mr. Tegetmeier replied that it was a common occurrence for bees to visit a tenantless hive, in which comb was left, and clear out the refuse, after which a swarm would take possession of the hive: in the present case the existence of the new wax was indubitable, the scales on the floor-board showed that it had been recently made in the hive, and it was found in those places, and those only, in which the old combs had become detached from the sides of the frame and required support. If a queen had

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entered the hive she would immediately have laid eggs, and the bees would then have remained. He believed that bees somehow or other decided beforehand upon the place of which, on swarming, they would take possession; it was difficult otherwise to account for the perfectly straight and rapid flight of a swarm to a window or other suitable spot, such selected spot being often at the distance of a mile or two from their starting point. His view was that the swarm carried the queen, and not that the queen led the swarm.

Mr. Tegetmeier also exhibited a number of pieces of comb of the honey-bee showing singular formations of cells; the specimens had been picked out of heaps of old combs, and were not the result of special experiment or of artificial manufacture. One piece of comb contained a row of sixteen central (not marginal) cells which were pentagonal, two of the angles being right angles; a second piece contained a group of cells, some pentagons, some hexagons, of various degrees of irregularity, in the middle of a mass of the regular hexagonal form; a dependent piece of old comb had had formed on its edge a number of shallow cells which were nearly hemispherical cups, and which gradually ran into the hexagonal shape where they came in contact with the regular cells of the old comb; other pieces contained cells which appeared to be circular-cylindrical; and a specimen of comb containing three queen-cells had on each of those cells a number of hemispherical excavations. Mr. Tegetmeier was of opinion that the cell of the hive-bee was invariably hemispherical at its commencement, and a section of a cell which was not in contact with other cells was always circular; hemispherical cups or depressions were hollowed out, these excavations were made near to one another, almost in contact, and the bees enlarged them until they came in contact; the enlargement being continued to the full extent possible (or, in other words, the bees gnawing away all the material so far as was consistent with the integrity of the comb), the cells of necessity assumed the hexagonal form. He did not believe that the pressure of contiguous cells upon each other had anything to do with the form of the cell, nor did he believe in the existence of a "hexagonal instinct" or "geometrical instinct" in the bee; the hexagonal form was a consequence of the property of space that, of seven circles of equal radii, six will just surround the seventh; if it had been the case in nature that seven circles would just surround another of equal radius, then the cells of bees, when in contact, would have been heptagonal, instead of hexagonal.

Mr. F. Smith remarked that Mr. Tegetmeier's observation that a cell was invariably commenced as a hemisphere, if true of the hive-bee, was not true of all wasps, those, *e.g.*, which built dependent nests, starting from a flat or plane base.

Mr. F. Smith read the following account, supplied by Mr. S. Stone, of Brighthampton, of the manner in which that gentleman had induced a colony of wasps to construct the series of six nests, of extraordinary shapes, which were exhibited at the previous Meeting of the Society:—

"About the middle of the month of August, 1862, a large nest of Vespa germanica was taken by a person residing at Stanlake, a village adjoining Brighthampton. It was brought home by him, tied up in a handkerchief, and deposited for the night in a room in his house. In the morning word was sent me that if I could go down and fetch it away I might have it. Now it so happened that I could not go that day or the next, so it was allowed to remain where it was; but, as might have been expected, the insects very soon found their way through the handkerchief in which the nest was enclosed, completely riddling it, when a second was tied round it, which of course soon

shared the fate of the first. It was then placed in a sack, such a one as those used by farmers or millers, through which they were not long in making their way, although they must have found it tougher work than eating through the handkerchief. The sack with its contents was next put into a hamper and tied down. On the third day I had an opportunity of sending for it, and on its arrival proceeded to remove the different coverings, and make some arrangement for placing the combs contained in the nest (which, in consequence of the treatment to which it had been subjected, was of course in itself a complete ruin) in a more favourable situation for work than the one they then occupied. This was a ticklish piece of work, but somehow or other I managed to separate two or three combs from the mass, which I reduced in size with a pair of scissors, and running a wire through them placed them inside a small square box (No. 1 of the series), the combs resting on the bottom of the box and the wire reaching from thence to the top: I then fixed the box in the window of a room, making an aperture through the back of the box to correspond with one in the window, for the purpose of allowing the insects to pass out and in. The front of the box was of glass, moveable at pleasure, by means of which I could introduce a constant supply of sugar. I now collected together, in the best way I could, the workers belonging to the nest, and introduced them into the box; they numbered, I should think, somewhere about three hundred, and as the box contained only three small pieces of comb it was only possible for a limited number to work at them: the consequence was, that by far the greater number, after providing themselves with materials, were compelled to work wherever they could find room: the wire and all the sides of the box, except the glass front, which was frequently being moved, were speedily covered with the paper-like fabric, the produce of their labours. The insects were placed in the box on a Thursday afternoon, and on the following Saturday the work had proceeded and was proceeding so rapidly that I could perceive, if I let them go on till Monday, the box would be filled with a mass of work without beauty or design, so I determined upon fitting up another box in a somewhat similar way, and causing the insects to pass into it from the one they then occupied. I accordingly cut two or three more pieces of comb, and passing a wire through them suspended them inside a box (No. 2 of the series) of about the same size as the first, and similar thereto in other respects; then by tapping upon and shaking box No. 1, I caused most of the insects to leave it and pass out through the aperture in the window into the open air, then, by means of a sliding door, preventing their immediate return, I took box No. 1 away, and in its place put box No. 2; then, withdrawing the slide, the insects crowded into it and with seeming unconcern began working away as before. The combs not resting upon the bottom of the box, as in the former case, but being raised an inch or two above it, caused the workers to form a structure differing considerably from the first. On the following Wednesday the work had become so far advanced that I found it necessary to provide the workers with a fresh box; a larger one (No. 3 of the series) was therefore procured, and fitted up much in the same way as the last, and the insects were introduced into it in the same way as before; in seven days a structure somewhat resembling the last, but much larger, was raised, when another box (No. 4 of the series) was procured; this was provided with a moveable wooden back, which, when the building was finished, was replaced by one of glass. The box was fitted up in a way quite different from the preceding ones: two rows of pillars formed of wire, four in a row, the rows being about two inches apart, reaching from the bottom to the top, were placed at regular intervals across the box; at the base of each pillar, and also at the top, a small piece of comb

was fixed. The filling up of this design occupied the insects fifteen days, when another box (No. 5 of the series) was procured: this was fitted up in a manner differing somewhat from the last; four pillars were placed across the box, a little behind the middle, and two a little in advance, while between the two a short one, three or four inches only in height, was inserted, at the top of which, but not at the base, a small circular piece of comb was placed, while at the bottom as well as the top of the other columns pieces of comb were fixed: the erection of the singularly beautiful structure contained in this box only occupied the workers five days, when a fresh one (No. 6 of the series) was procured, fitted up in nearly the same style as the last: in other five days they raised a structure very similar to the preceding one, when they were shifted into a much larger box, fitted up in nearly the same way as the two previous ones had been, but the weather becoming cold they did not make progress enough to bring their work in this box to anything like perfection.

"One of the chief objects wasps have in view in their building operations is to enclose the combs so as to ensure as high and as uniform a degree of temperature as may be,—a thing essential in the hatching of the eggs and the well-being of the larvæ when produced: thus by placing combs or pieces of comb in particular positions the insects are literally compelled, in their endeavours to cover them in, to carry out the design of the person so placing them.

"One reason why the work was not attached either to the back or front of cases 4, 5 and 6 was, that the pillars or columns were placed at some distance from each of those sides, and as there were no intervening combs, or pieces of comb, to be covered in, the operations of the insects did not extend in either of those directions sufficiently far to reach them during the period they were allowed to remain in each box."

Mr. Stainton exhibited a new Gelechia, allied to G. nigricostella, and for which he proposed the specific name of Lathyri, the moth having been bred by Mr. Brown, of Cambridge, from larvæ which fed on Lathyrus palustris.

Prof. Westwood mentioned that the larvæ found by Captain Cox in a bin of bran, and exhibited at the Meeting on the 2nd of May last(*ante*, p. 20), had proved to be Pyralis farinalis.

Paper read.

Mr. Roland Trimen, of Cape Town, communicated a paper entitled "Descriptions of some new Species of Butterflies found in Southern Africa." Sixteen species were characterized, one of which belonged to the Pieridæ, one to Satyridæ, six to the Lycænidæ, and eight to the Hesperidæ. Ten out of the sixteen were discovered by Mr. James Henry Bowker, Inspector of Mounted Police, who for several years has devoted his leisure to the observation and collection of the Flora and Fauna (especially the Lepidoptera) of Kaffraria.

New Part of 'Transactions.'

A new part of the Society's 'Transactions' (Third Series, Vol. ii. Part 1), being the second quarterly Part for 1861, containing Major Parry's Catalogue of the Lucanoid Coleoptera, with descriptions of new, and remarks on some of the rarer, species, and illustrated with twelve plates, was announced as ready for distribution.

August 1, 1864.

The Rev. Hamlet Clark, V.P., in the Chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Memorias de la Real Academia de Ciencias de Madrid,' 1a Ser. Tom. 1e, par. 2a; 2a Ser. Tom. 1e, par. 3a, Tom. 2e, par. 1a; presented by the Academy. 'Schriften der Königl. Physikalisch-ökonomischen Gesellschaft zu Königsberg,' vol. 4, parts 1 and 2; by the Society. 'Bulletin de la Société Imperiale des Naturalistes de Moscou,' 1863, Nos. 1 and 2; by the Society. 'Transactions of the Zoological Society of London,' Vol. v. part 3; 'Proceedings of the Zoological Society of London,' 1863, parts 1—3; by the Society. 'Proceedings of the Royal Society,' Vol. xiii. No. 65; by the Society. 'The Zoologist' for August; by the Editor. 'The Entomologist,' Vol. ii. No. 4; by the Editor. 'The Entomologist's Monthly Magazine,' No. 3; by the Editors. 'The Reader' for July; by the Editor. 'The Journal of the Society of Arts' for July; by the Society. 'British Moths and their Transformations,' by H. N. Humphreys and J. O. Westwood; 'Essai Monographique sur la Tribu des Psychides,' par T. Bruand; 'The Lepidopterist's Calendar,' by Joseph Merrin; 'La Flore des Insectophiles,' par Jaques Brez; 'Catalogue Synonymique des Coléoptères d'Europe et d'Algerie,' par J. Gaubil; 'Genera et Index Methodicus Europæorum Lepidopterorum,' a Doctore J. A. Boisduval; 'Europæorum Micro-Lepidopterorum Index Methodicus,' par A. Guenée; 'Die Tineen und Pterophoren der Schweiz,' von Prof. Frey; 'Letters of Rusticus;' 'Wahre Parthenogenesis bei Schmetterlingen und Bienen,' von C. T. E. von Siebold; 'On a true Parthenogenesis in Moths and Bees,' by C. T. E. von Siebold, translated by W. S. Dallas; presented by J. W. Dunning.

The following addition, by purchase, was also announced:—'Berichte über die wissenschaftlichen Leistungen im Gebiete der Entomologie,' 1838—1847, von Dr. W. F. Erichson.

Exhibitions, &c.

Mr. Bond exhibited Gelechia pinguinella, a species new to Britain, found on the trunks of poplars near London; and a specimen of Nyctegretes Achatinella, one of the rarer British Phycidæ, captured by Mr. Thomas Brown near Yarmouth.

Mr. J. Jenner Weir exhibited an albino variety of Eubolia bipunctaria, caught on the South Downs.

Professor Westwood, in calling attention to the preparation, by Mr. Baker of Cambridge, of a larva of Zenzera Æsculi, took occasion to observe that the upholders of the law of priority in nomenclature were bound to restore the name Zenzera in lieu of Zeuzera: Zenzera was the name first given to the insect by Latreille, and it was only by a typographical error that Zeuzera had ever appeared.

Mr. M'Lachlan exhibited a specimen of Libellula striolata, from Montpellier, having the veins at the basal part of the anterior wings covered with specimens of a red species of Acarus.

Prof. Westwood remarked that the Acari had probably taken up their position for the purpose of sucking some fluid matter, which went to show that the wing-veins were not (as had been supposed) mere horny matter, not containing fluid.

Mr. F. Smith doubted whether the Acari had placed themselves on the wing-veins in search of food or suction; humble-bees were often covered with these insects, and

300 or 400 Acari might be found on a single specimen, so that the humble-bee actually fell to the ground through their weight; he thought that the Acari fed on the comb, and crawled upon the body of the humble-bee when within the nest, and so were carried out. The presence of Acari on the dung-beetles (*Geotrupes*) also was notorious.

Mr. Edwin Shepherd referred to the frequent occurrence of Acari on butterflies, and thought they were picked up from the flowers which the butterflies visited.

Prof. Westwood directed attention to the editorial note appended to an article headed "Larval Reproduction in Insects," at p. 56 of 'The Entomologist,' vol. ii.: Mr. Newman there stated as a fact that the larvæ found by Prof. Wagner within the Dipterous larvæ from Kasan were "those of one of the Pteromalidæ which habitually infests the larvæ of Diptera." This might be so, but no grounds for the statement were adduced, and it did not appear that Mr. Newman had had any opportunity of investigating the point. It should be borne in mind that Prof. Wagner was perfectly well aware of "the familiar parasitism of the Ichneumonidæ" before publishing his discovery in Siebold and Kölliker's Zeitschrift, and in fact the course of his observations had been guided by his knowledge of the habits of the Pteromalidæ. At any rate, he (Prof. W.) protested against the dogmatic assertion of the editor of 'The Entomologist,' as tending to shut out from further inquiry a question which, to say the least, was as yet an open one, and of which further investigation was most desirable.

Papers read.

Mr. Baly read a paper entitled "Descriptions of uncharacterized Genera and Species of Phytophaga," in illustration of which the new species were exhibited.

Mr. Hewitson communicated "Descriptions of four new Butterflies" (with drawings),—Helcyra Hemina from East India; Limenitis Labotas, from Menado; L. Ligyes, from Northern India; and Laogona Lilæa, from East India.

The Rev. H. Clark read "Notes on the Genus Hydaticus of Leach, with descriptions of new Species." The new species were thirteen in number, *viz.* Hydaticus Bakewellii, from Moreton Bay; H. Adamsii and H. aruspex, from China; H. verecundus (from South America and Java?); H. Bowringii, from China and Australia; H. Ussherii, H. paganus, H. matruelis and H. fulvonotatus, from the Gold Coast; H. nigro-marmoratus, from Angola; H. parallelus (from New South Wales and the Cape of Good Hope?); H. histrio, from Northern India; and H. nigro-vittatus, from Japan.

September 5, 1864.

F. P. Pascoe, Esq., President, in the Chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Catalogue of North American Butterflies,' by J. W. Weidemeyer; presented by the Author. 'Abhandlungen der Naturhistorischen Gesellschaft zu Nürnberg,' Bd. 3; by the Society. 'The Zoologist' and 'The Entomologist' for September; by the Editor. 'The Entomologists' Monthly Magazine' for September; by the Editors. 'The Naturalist,' Nos. 1—9; by the West Riding Consolidated Naturalists' Society. 'The Intellectual Observer,' Nos. 31 and 32; by the Publishers. 'The Journal of the

Society of Arts' for August; by the Society. 'The Reader' for August; by the Editor. 'The Athenæum' for July and August; by the Editor.

The following addition by purchase was also announced:—C. G. Thomson, 'Skandinaviens Coleoptera,' Vol. 6.

Election of Member.

James Bladon, Esq., of Pontypool (already an Annual Subscriber to the Society), was ballotted for and elected a Member.

Exhibitions, &c.

Mr. Dunning exhibited a number of full-fed larvæ of a Noctua (Agrotis segetum, or A. exclamationis?), which had been sent to him by Mr. J. D. Kay, from Brantingham, in the East Riding of Yorkshire. Mr. Kay had had a field of turnips, worth £150, entirely destroyed by these caterpillars. Numerous similar instances from various parts of the country were mentioned, and it was stated that their ravages were not confined to the turnip-crops.

Mr. E. W. Janson exhibited four species of Coleoptera hitherto unrecorded as British, and communicated the following in reference thereto:—

"1. Euryusa sinuata, *Eric.*

Euryusa sinuata, *Eric. Kaef. d. Mark Brand.* i. 372, 1 (1839); *Gen. et Spec. Staph.* 199, 1, tab. 1, f. 2 (1839). *Kraatz, Naturg. d. Ins. Deutschl.* ii. 73, 1 (1856).

A single specimen, the only indigenous example of this interesting species which I have seen, captured by the Rev. A. Matthews, many years since, in Oxfordshire.

It is readily distinguished from its near ally, E. laticollis, *Heer*, by its short prothorax, the sinuate hinder margin of this segment, and its nearly rectangular posterior angles.

"2. Leptusa analis, *Gyll.*

Aleochara analis, *Gyll. Ins. Suec.* ii. 388, 11 (1810).

Oxypoda analis, *Eric. Gen. et Spec. Staph.* 154, 29 (1839).

Leptusa analis, *Kraatz, Naturg. d. Ins. Deutschl.* ii. 62, 2 (1856); *Thomson, Skand. Col.* ii. 275, 1 (1860).

Captured during the past month in the Black Forest, Perthshire, by Mr. D. Sharp.

Differs conspicuously from L. fumida in its superior size, reddish brown hue, semiopaque surface, and more strongly and coarsely punctate abdomen.

"3. Aleochara spadicea, *Eric.* (Var. major. Long. 2 lin.; elytris piceis.)

Ocalea spadicea, *Eric. Kaef. d. Mark Brand.* i. 300, 3 (1839); *Gen. et Spec. Staph.* 61, 3 (1839).

Alcochara spadicea, *Kraatz, Naturgesch. d. Ins. Deutschl.* ii. 98, 18 (1856).

Taken by Mr. J. A. Brewer, in Cumberland, in the autumn of 1863.

I communicated this specimen to Dr. Kraatz, who returned it to me labelled "Ab *Aleochara spadicea* vix distincta."

It appears to me not improbable that Alcochara procera, *Eric.*, *Kraatz* (Ocalea procera, *Eric*), will ultimately prove to have been founded on large dark individuals of the species now under consideration; the specimen exhibited presenting, in its superior size, piceous elytra, and foveolated prothorax, several of the characters assigned to A. procera.

"4. Homalota notha, *Eric.*

Homalota notha, *Eric. Gen. et Spec. Staph.* 126, 101 (1839); *Kraatz, Naturg. d. Ins. Deutschl.* ii. 323, 127 (1856).

Gyrophæna exigua, *Heer, Faun. Col. Helv.* i. 312, 7 (1839).
Gyrophæna pilosa, *Hampe, Stett. Ent. Zeit.* xi. 348, 5 (1850); teste *Schaum, Stett. Ent. Zeit.* xiv. (1853).

Captured by Mr. J. A. Brewer beneath rejectamenta of the River Medway.

The extraordinary resemblance which this species bears to the members of the genus Gyrophæna has, as will be remarked by the above synonymy, misled more than one author concerning its true affinities."

The Rev. Hamlet Clark exhibited a specimen of Buprestis ocellata, a native of Central India, which had been found on board ship between Mauritius and Madagascar, and upwards of fifty miles from land. Prof. Westwood thought the beetle had probably been bred on shipboard.

Mr. B. T. Lowne (who was present as a visitor) said that he once took a specimen of a moth belonging to the genus Audea at sea, and more than 200 miles from the West coast of Africa, which was the nearest land to windward at the time. The genus Audea was previously known to contain two species only, both from Sierra Leone; but the specimen captured as above had proved to be a new and undescribed species, which, so far as he was aware, still remained unique. He had also noticed a butterfly and several grasshoppers on board the ship, all of which must, he thought, have been on the wing for several days, during which they were borne over the sea by the trade-wind.

Mr. S. Stevens exhibited a complete set of the species of butterflies and beetles captured by Mr. Lowne in Southern Syria and Palestine, during the present year.

Mr. Lowne said that the greater part were captured in the months of April and May. Amongst the butterflies, he called attention to a new Lycæna, an Anthocharis, probably new, two species of Gonepteryx, one from the valley of the Jordan, the other (G. farinosa of Lederer?) from Hermon and Lebanon, and to a Papilio closely allied to P. Podalirius, but in his opinion distinct. It differed from its European ally in the greater length of the wing-tails, in the ocelli at their base, and in the markings on the under side of the wings; he had not found P. Podalirius in Syria at all; the new insect, which he regarded as the Eastern representative of P. Podalirius, had occurred near Damascus only. With respect to the Coleoptera, Mr. Lowne said that the country was generally but ill supplied with water, and was too dry for collecting; he had found sweeping unproductive; some Geodephaga he had taken on the coast only; Heteromerous beetles were the most numerous insects, and occurred on flowers, under stones, and in fact everywhere. But on the whole he considered the insect Fauna of Syria poor in comparison with the Flora: like the latter, it was chiefly European in its character, though some of the insects from the South partook of the African type.

Mr. J. R. Larkin, of Elm Cottage, Old Brompton Road, exhibited a novel form of case for the reception of insects; the top and all the sides were of glass; the bottom corked in the usual manner, and framed, so that the whole might be hung picture-wise against a wall.

Mr. Tegetmeier read and presented to the Society an extract (probably) from a provincial (Ipswich?) newspaper of 1833, which contained an account of the first scientific meeting of the Entomological Society of London. [This extract is now affixed to the first volume of the 'Transactions' in the Library.]

Mr. Tegetmeier also brought under the notice of the Society the letters recently published in 'The Times' on the subject of bees and bee-keeping; and quoted

numerous errors into which the writer had fallen; such, *e. g.*, as the statement that the queen selects her husband and passes her honeymoon amid the flowers, that a swarm of bees is as large as a bunch of grapes, that bees are affectionate and fond of children, &c. It was to be regretted that a fictitious value had been given to so worthless a compilation by insertion in the columns of an influential journal; many of the statements of the writer had been answered and exposed by Mr. Woodbury in the same journal, but as a further communication from that gentleman had been refused insertion in that newspaper, Mr. Tegetmeier thought it right to give the Members of the Society an opportunity of placing on record their opinions on the matters in question, lest entomologists abroad should imagine that the letters of "The *Times* Bee-master" represented the amount of practical and scientific knowledge current in this country on the subject under discussion.

Prof. Westwood and the Rev. Hamlet Clark also remarked upon the inaccurate and improper manner in which the question had been treated by the anonymous correspondent of 'The Times.'

Prof. Westwood mentioned that he had recently been informed by a correspondent of a disgusting practice which was alleged to prevail in the public parks of London; the charge was nothing less than this, that lice were placed upon the public seats in the parks, with a view to compel the frequenters of those places of resort to hire the chairs which, for their private advantage, certain persons were allowed to let out at a small charge.

Lieut. R. C. Beavan, Bengal Revenue Survey, communicated the following "Remarks on the Tusseh Silkworm of Bengal."

"Syn.—Antheræa Paphia, *Linn.* Bombyx Paphia, *Sykes*, *Trans. As. Soc. Lond.* iii. 541 (plate); Saturnia Paphia, *Helfer*, *Journ. As. Soc. Bengal*, vi. 42 (1837); Tusseh Silkworm Moth, *Hind. Helfer;* Bughy Silkworm Moth of the Beerbhoom Hills, *Roxburgh;* Kolisurra Silkworm Moth of the Mahrattas, *Sykes;* Munga Silkworm Moth of the Méchis, *B. H. Hodgson;* Koukuri Mooga of the Assamese, *Hugon*, *Journ. As. Soc. Beng.* vi. 32 (1837).

"Further mention by writers.—Horsfield's 'Catalogue of the Lepidopterous Insects in the East India House Museum,' ii. 385, No. 916 (1858-9); Col. Gastrell's 'Report on Survey Operations in the District of Bancoorah;' Capt. Walter Sherwill's 'Report on Survey Operations in the Beerbhoom District;' Lieut. Kittloe's 'Journey through the Forests of Orissa,' Journ. As. Soc. Beng. viii. 680; Mr. F. Moore's paper 'On the Silk-producing Bombycidæ of Asia,' Proc. Zool. Soc. 1859; Dr. Walker, 'On the Natural Products of the Country about the Pundeelah River in the Nizam's Territory,' Journ. As. Soc. Beng. part 2, vol. x. (1841); and various notices in Journal of Agri-Horticultural Society.

"List of trees on which the Tusseh larva feeds.—Sal, or Sakwa, or Sakooa (*Shorea robusta*, Roxb.); Badaam, or country almond (*Terminalia catappa*, Linn.); Pullas or Dhak (*Butea frondosa*, Roxb.); Arsun (*Terminalia alata* or *T. glabra*, Wight); Teak or Sagwan (*Tectona grandis*, Linn.); Bair or Byre (*Zizyphus jujuba*, Lam.); Toot or Toout, "Indian Mulberry" (*Morinda citrifolia*, Linn.?); Semul or cotton tree (*Bombax heptaphyllum*); Koossum or bastard safflower (*Carthamus tinctorius*, Linn.)

"The tusseh silkworm is reared in considerable quantities in Maunbhoom, Bancoorah and Beerbhoom, and its silk, both in the raw and made-up states, forms one

of the principal articles of export from these and adjoining districts. In Maunbhoom the arsun tree is planted by the natives in small plots near their villages for the purpose of affording food to the larvæ, and the branches are annually lopped off, to prevent the larvæ from getting beyond the sight and reach of those who watch them. The larvæ when first born are placed on these trees, and forage for themselves until the time arrives for them to change into the pupa-state, their keepers merely keeping off birds, ants, snakes, squirrels and bats, all of which are said to feed on the worm, though I am inclined to doubt its being the case with the last three animals. The tusseh-breeders in Maunbhoom are either Bonries or Southals: many of them cultivate lac as well, which also requires to be watched, and as this insect thrives best on the same tree as the tusseh, *viz.* the arsun, they are able to combine the two pursuits. I am not aware that any animals prey upon the lac insect; ants are very fond of them, but I fancy only on account of the sweet fluid exuded by this as well as other species of Aphidæ, and not with murderous intent. These are obliged to be watched, in order to keep them secure from the thieving propensities of the other villagers."

After quoting at some length from Dr. Walker's paper (*ubi suprà*), and noticing that many of the facts therein recorded applied equally well to other parts of the country than the territory of the Nizam, the author proceeds:—

"In Maunbhoom the cocoons are sold at the rate of eighty to one hundred per rupee by the tusseh-breeders. I have found it quite easy to rear the tusseh worm in captivity. Having procured a batch of some fifty fresh cocoons from the Maunbhoom jungles in April, 1864, I proceeded to try the experiment, and being of opinion that this species might be easily acclimatized on the mulberry in England, sent thirty-five cocoons, through Mr. F. Buckland, to the Acclimatization Society, as well as some of the eggs laid by the moths that came out of the remaining cocoons. I have not as yet (July 18, 1864) had the advice of their safe receipt. With regard to those I have reared myself, I take the following extracts from my note-book:—

"On the 4th and 5th of June the moths began to come out of their cocoons, and continued to do so nearly every damp and rainy night afterwards. Out of my whole batch only one had died. They invariably come out at night, and seem strictly nocturnal in their habits in the imago state. The average expanse of wing of the female is 7 to 7½ inches, and of the male 6¼ to 6½ inches. The colour of the cocoons, and of both sexes of the moths, varies considerably; the males are generally of a dark fulvous-buff, fulvous-gray, and light slaty gray colour; the females fulvous-gray, light gray, or bright grayish yellow. The sexes copulated freely in confinement, always at night, and generally the second night after birth. The females do not try to fly away, though the males do, and damage themselves much in the attempt. They seem to prefer hanging head downwards, and from the under side of a leaf: this probably is a wise provision of Nature to keep them hidden during their diurnal sleep by the leaf they may be on, from their numerous winged enemies. Of all the cocoons I had only one came out during the day, and that early in the morning; they mostly appear between midnight and 4 A.M. The moths are very tenacious of life; after being kept twelve hours under chloroform they recover, and a pin dipped in prussic acid and put through them has no other effect than to make them discharge a black liquid from the wound. For a long time I was quite at a loss how to put an end to the existence of those I wanted as specimens, and at last found that the only effectual method was to plunge them into boiling water, keeping only the body immersed, for about two

minutes. The female moth lives longer than the male; the latter dies after copulation, which takes place more than once if he is disturbed at first. The females begin to drop their eggs the second or third day after birth, often before impregnation, and die after all are laid, *i. e.* in five or six days.

"On the 17th of June the first batch of worms made their appearance, and on being placed on the young leaves of the Badaam or country almond (*Terminalia catappa*), began to feed greedily. The leaves are changed every morning, and kept in a tumbler of water or damp mould, placed inside a gauze-covered box. Care had to be taken, when the worms got large, to keep them supplied twice a day with fresh leaves, morning and evening, and not to put too many together. I lost a large number, more than half-grown, from overcrowding. The heat thus generated caused them to get quite putrid, and one dead one in this state, unless speedily removed, will cause quite an epidemic amongst the rest.

"June 17. The tusseh worm when born is about one-fourth of an inch in length; body hairy and of a chrome-yellow colour; head and tail black, a tuft of black hair on the neck, just behind the head, and another smaller tuft of the same colour near the tail; a row of minute black spots down the middle of the back connects these two; there is also a row of similar black spots down either side above the legs. Head and body fringed with yellow hairs. Head black and shining, and large in proportion to body.

"June 21. The worms born on the 17th are now nearly an inch long, and have lost the brownish tinge they had when first born. The colour is now a light green, covered with little light green spines, each spine terminating in a tuft of light-coloured hair. The head at first is black; behind it, and separated from it by a little green band, is another patch of black; there are two little black spots or spines on the second segment, and one on the anal segment; these spines are tufted with black hair. The row of black spots down the back are of a bluish tinge, and those down the sides appear to be the spiracles.

"June 21. (Second stage). The ground colour of the worm is now a bright yellowish green; he is still about an inch in length, but thicker and broader, especially about the head and shoulders. The black spots down the centre of the back have entirely disappeared; instead, on either side of where they were, are two rows of yellow spines or dots, light yellow at the base, orange-yellow at the tips, and surmounted by star-shaped tufts of black hair, the pair on the second segment the largest. The head and prolegs brown. Four separated black spots, in place of the black patch on the head. The row of spiracles is scarcely visible; on each side of them a row of yellow spines has appeared, making, with those on the back, altogether six rows of these spines from head to tail parallel with each other, and covered with tufts of hair. A brownish tinge on last pair of legs and lower part of anal segment, the latter covered with hairs.

"June 25. (Third stage). The caterpillar is now a little more than 1½ inch long, of a beautiful light green colour, with a yellow stripe down each side from the third segment to the tail, which has a brown triangular patch on each side, edged with light yellow. The spots on the rows of spines on the back have changed to a glittering golden yellow colour, the pair on the second segment surmounted by a star of black hairs. The spots on the two rows down each side have also changed; they are now orange at base and sky-blue at tips. Prolegs and head light brown, as also are the hind legs, with small black spots and hairs above them. A yellowish collar of skin round the head, with its attendant spines, which are yellow on the capital segment,

and, like the rest, surmounted by black hairs. The eight spiracles down each side are plainly visible, between the two side-rows of spines and below the yellow band.

"June 27. The caterpillar, when in a state of rest, hangs head downwards, prolegs and head doubled up, and hanging only by its hind legs. They grow wonderfully fast, and appear on the whole hardy, not requiring much care. At this stage they are much like the figure of the larva of Actias Selene in Horsfield's Catalogue.

"June 29 or 30. (Fourth stage). The caterpillar is now about two inches in length. The spots on the two middle rows of spines are all of a glittering golden orange colour, still surmounted by a few black hairs, but several pure white hairs have appeared about them, on the back only, not extending down the sides. The upper and lower rows of spots on the sides are of a bright blue colour. The head and prolegs of a rich brown; the spiracles orange-brown inside, edged first with black, then with light yellow.

"July 4. (Fifth stage). Caterpillar much the same as before. The spots on the sides, especially on the first few segments are like shining silver, based by blue, and contrast beautifully with the golden hue of the spots on the back.

"July 13. The first caterpillar began to spin. Before doing so the blue spots changed to a beautiful mauve-purple colour, which change, accompanied by increase of length to 3½ inches, about the 8th or 9th of July, may be called its sixth stage, for although I did not see the skin cast, it might have been done during the night.

"The larvæ invariably eat their skins after casting them.

"When about to change, the worm is 4¼ inches in length. The process of spinning is well described by Lady Gilbert, whose account I quote (from Horsfield's Catalogue):—'The caterpillar commences its operations by drawing a few leaves slightly together, as if to screen it from observation. It then spins a strong cord, composed of many threads, altogether about the thickness of a crow-quill, at the end of which it weaves the cocoon.' One end of this cord is looped round a twig, and when hard the cocoon cannot be detached without cutting the twig close to this loop. In the Maunbhoom jungles the cocoons may be seen hanging from the bare branches of the Sál trees in March, and are apparently constructed without any assistance from or connexion with the surrounding leaves. Lady Gilbert continues:—'The cocoon is so transparent for the first six and thirty hours that the larva may be distinctly perceived at work in the interior; after that time the cocoon gradually acquires consistency by the continual industry of the caterpillar, and becomes quite opaque from the addition of a glutinous liquid with which it moistens the whole. When that dries the cocoon appears as if covered with white powder, and in the course of a couple of days becomes perfectly hard.' I have not observed this transparency of the cocoon. Some of my cocoons are much darker than the rest, and some light yellow, though the worms have all had the same food."

Papers read.

Prof. Westwood read "Descriptions of new Species of Sagrides and Megalopides from the Old World and Australia."

The Rev. Hamlet Clark read "Descriptions of Species composing the genus Schematiza, *Chev.* (Phytophaga, Gallerucidæ)."

New Part of the 'Transactions.'

A new part of the 'Transactions' (Trans. Ent. Soc. Ser. 3, Vol. ii. Part 2), which had been published since the previous Meeting, was on the table.

October 3, 1864.

F. P. Pascoe, Esq., President, in the Chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Exotic Butterflies,' by W. C. Hewitson, Part 52; presented by W. Wilson Saunders, Esq. 'Journal of the Proceedings of the Linnean Society,' Vol. viii. Part 1; by the Society. 'Boston Journal of Natural History,' Vol. vii. No. iv.; 'Proceedings of the Boston Natural History Society,' Vol. ix. Sheets 12—20; by the Society. 'Notes on the Family Zygænidæ,' by A. S. Packard, jun.; by the Author. 'The Zoologist' and 'The Entomologist' for October; by the Editor. 'The Entomologist's Monthly Magazine,' No. 5; by the Editors. 'The Journal of the Society of Arts' for October; by the Society. 'The Reader' for October; by the Editor. 'Popular Natural History of Great Yarmouth,' by B. T. Lowne; by the Author.

The following addition by purchase was also announced:—'Genera des Coléoptères d'Europe,' Livr. 121—123.

Exhibitions, &c.

The Secretary announced the arrival of, and exhibited, a miscellaneous collection of insects from India, collected and presented to the Society by Lieut. R. C. Beavan, Bengal Revenue Survey. Probably the most interesting specimen was a small Mantis, which Prof. Westwood believed to be hitherto unique in his own collection.

Mr. Janson exhibited an extensive series of insects of all orders collected by Mr. Thomas Pullinger, R.N., chiefly in the vicinity of Rio Janeiro.

Major Parry sent for exhibition a box of beetles collected at Gibraltar by his son, Lieut. Parry, R.A.

Mr. S. Stevens exhibited a large Curculio, from the body of which a number of filamentous Fungi had grown. Prof. Westwood remarked upon the frequent occurrence of fungus-covered Curculionidæ, and suggested that it arose from those beetles dying amongst decayed wood and in damp situations conducive to fungoid growth. Prof. W. also alluded to the different kinds of "mould" found upon beetles, some of which were soft, like cotton-wool, whilst others were hard and required to be actually scrubbed off the specimen: he thought there were not less than six or eight kinds of mould to be found on insects.

Mr. Bond, after referring to the exhibition at the previous Meeting (*ante* p. 38) of larvæ of an Agrotis, which had proved very destructive to turnips, and giving corroborative testimony to the extent of the damage done by the insects, mentioned that, on opening a partridge which he recently shot, he found the crop full of the larvæ which infested the turnips.

Mr. David Sharp sent for exhibition three species of Coleoptera new to the British List, and one of them apparently undescribed: all three were recently captured by him in Scotland. The following description and notes were also communicated:—

" 1. Autalia punctcollis (*nov. spec.*).

Nigra, nitida, subtilius pubescens, antennarum articulo primo pedibusque piceis, prothorace abdomineque evidentius punctatis, illo medio obsolete canaliculato. Long. 1 lin.

With the facies of A. rivularis, but the size of A. impressa; from the former of these it differs by having its prothorax more evidently punctured, with the central channel only perceptible anteriorly; the lateral foveæ are not so deeply impressed, and those at the base of the elytra shorter. Apex of the abdomen concolorous. From A. impressa it is readily distinguished by its colour and punctured abdomen.

Four specimens from Rannoch, Perthshire; and one in Mr. Janson's collection, taken some years since in Shetland by the late Mr. Squire.

2. Tachinus proximus, *Kraatz*, *Stett. Ent. Zeit.* xvi. 25; *Ins. Deutschl.* 401.

Besides the characters pointed out by Kraatz as distinguishing this species from T. humeralis, there appears to be a constant difference in the length of the elytra, these being always relatively shorter in T. proximus.

Found by me in sheep's dung at Rannoch, and about half a dozen specimens under the same circumstances on Ben Lomond.

3. Lesteva monticola, *Kiesenw. Stett. Ent. Zeit.* viii. 77. *Redtenb. Faun. Austr.* ed. ii. 245. *Kraatz*, *Ins. Deutschl.* 933.

I have seen three British specimens of a Lesteva, which I believe should be referred to this species. Two taken by myself, one of them at Rannoch, the other in the Isle of Arran. The third is in Mr. Janson's collection, and was captured, I think, on the Cheviots."

The President exhibited a new Atractocerus and a new Cyphagogus, and read the following notes respecting them:—

" The genus Atractocerus is one of the most remarkable amongst the Coleoptera, and bears a greater resemblance to a Neuropteron than to anything in its own order; and yet we find this genus, one of the most specialized of its class, distributed over Africa, Madagascar, Java, the Malayan Islands, Australia and Brazil,—in fact, over almost all parts of the world, excepting Europe. In the Malayan Islands, Mr. Wallace discovered not less than twelve new species of this genus; Singapore and New Guinea (Dorey), the two extremes, produced each one; Borneo (Sarawak) five; the rest were scattered among the other islands. The only published species, A. morio, *Pasc.*, is the only one that appears to be common to three or four localities. If we adopt the derivative hypothesis of the origin of species, it will follow that a connexion must once have existed between the above-mentioned parts of the world, and this would pretty nearly lead to the conclusion that all lands were once connected. The Atractoceri would seem to possess a very low power of flight, and to be nocturnal. The Molucca species, A. morio, has certainly no appearance of being an intermediate form, as might have been expected. The Australian species now exhibited is new to Science; I am indebted for my specimen to Mrs. Kreusler, of Gawler, South Australia, a lady who, as I have previously testified, has been extremely fortunate in adding to our knowledge of the insect fauna of that colony, and to whom I have the pleasure of dedicating the species.

Atractocerus Kreusleræ.

A. brunneo-ferrugineus; capite brevi; oculis rotundatis, prominulis, antice fere contiguis; prothorace quadrato, subnitido, capite latiori; elytris oblongis, intus sinuatis; alis obscure griseis; abdomine castaneo, nitido; pedibus attenuatis, griseo-brunneis; pectore rufo-castaneo. Long. 12 lin. Hab. Gawler (Austral. merid.).

To Mr. Odewahn, also of Gawler, I owe, among many rare and interesting insects, a curious little Brentid belonging to the genus Cyphagogus of Major Parry, almost identical with a species from Natal described by me two or three years ago under the name of C. advena (Journ. of Entom. ii. 48). The type species is Indian, and has also been found by Mr. Wallace in Aru, but belongs to another category of the genus. I have dedicated the Australian species to Mr. Odewahn, and it may be thus characterized, merely premising that C. advena has a much larger head with a bilobed or emarginate muzzle, and this is almost all that distinguishes it:—

Cyphagogus Odewahnii.

C. rufo-testaceus, nitidus; capite prothorace multo angustiore, rostro integro; elytris prothorace angustioribus, striato-punctatis; pedibus ut in *C. advena*. Hab. Gawler (Austral. merid.)."

Mr. A. R. Wallace remarked that he thought the Atractoceri were wood-borers; he had always captured them at night, at a lamp or light, and had found them to be rather quick flyers.

Paper read.

Mr. Baly read a paper intituled "Further Descriptions of New Genera and Species of Phytophaga." Two new genera, Charistena and Metaxycera are established, both belonging to the Hispidæ and nearly allied to Odontota. Of Charistena, C. ruficollis, *Fabr.*, is the type, and seven new species are described under the names of C. Lecontii (from North America), C. basalis (from the Amazons), C. Deyrollei (Upper Amazons, Columbia), C. bellula (Bogotà), C. elegantula (New Granada), C. Pilatei (Teapa), C. trilineata (Yucatan). Of the genus Metaxycera, M. purpurata, *Guér.*, is the type, and three new species from the Amazons are described under the names of M. rubroguttata, M. Amazona and M. sex-pustulata.

New Part of 'Transactions.'

A new part of the 'Transactions' (Third Series, Vol. iii. Part 1), containing the first portion of Mr. Pascoe's Longicornia Malayana, was on the table.

November 7, 1864.

F. P. Pascoe, Esq., President, in the Chair.

Presentation to W. W. Saunders, Esq.

Prior to the scientific business of the Meeting, a handsome silver vase was presented by the President, on behalf of numerous Members of the Society, to W. Wilson

Saunders, Esq., F.R.S., &c., in acknowledgment of the generous aid which for years he has bestowed upon everything tending to advance the Science of Entomology, and in recognition of his unvarying kindness and the constant and liberal support which he has given to the Society.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'The Journal of the Royal Agricultural Society,' Vol. xxv. Part ii.; presented by the Society. 'Mémoire sur le Pou à poche blanche;' by the Author, M. E. Icery, D.M.C.P. 'Corynodinorum Recensio;' by the Author, the Rev. T. A. Marshall, F.L.S. 'The Zoologist' and 'The Entomologist' for November; by the Editor. 'The Entomologist's Monthly Magazine,' No. 6; by the Editors. 'The Journal of the Society of Arts' for October; by the Society. 'The Reader' for October; by the Editor. 'The Athenæum' for October; by the Editor. 'Stettiner Entomologische Zeitung,' Vol. 25, Nos. 10—12; by the Entomological Society of Stettin. 'Amtlicher Bericht über die 38ste Versammlung deutscher Naturforscher in Stettin im September, 1863;' by Dr. C. A. Dohrn. 'Report of the Commission appointed to enquire into the causes of decay in Wood Carvings, and the means of preventing and remedying the effects of such decay;' by Professor Westwood.

Exhibitions, &c.

Mr. Janson exhibited four species of Coleoptera belonging to Mr. Joseph Sidebotham, of Manchester, and all new to the British list. They were (1) Ceuthorhynchideus Poweri, *Rye*; two specimens taken by Mr. Sidebotham in Silverdale, near Lancaster, between the 14th and 18th of May, 1864, most probably by sweeping on the borders of the woods near the shore; (2) Lixus filiformis, *Fabr.*; a single specimen (at first taken for L. bicolor) captured by Mr. Sidebotham by beating the oak or birch in a wood on the side of Roundney Hill, near Devizes, early in June, 1864; (3) Sybines canus, *Herbst*; two specimens taken by Mr. Sidebotham, by sweeping, in a lane between Devizes and Pottern, early in June, 1864; (4) Peritelus griseus, *Oliv.*; several specimens were collected at Ventnor in April, 1864, by Mr. Wainwright, probably by shaking herbage upon a sheet of paper, in which manner some bottles full of Coleoptera had been obtained by that gentleman.

Mr. F. Smith exhibited three males and a female of a Bombus new to Britain, the Bombus pomorum of Panzer: the males were captured some years ago, and had been placed in his collection as a variety of another species; the female was the specimen exhibited at the Meeting in June last (*ante* p. 26), and was captured at Deal.

Mr. Edwin Shepherd (on behalf of Mr. S. Carter, of Manchester, who was present as a visitor), exhibited three males and a female of Sesia spheciformis, *W.V.*, bred from pupæ found in the stems of alder-trees in the north of Staffordshire.

Mr. W. W. Saunders exhibited some galls which he had found in making an excavation at the foot of an oak about a month previously; the galls were attached to the root of the tree, but were not in clusters, and were at a depth of four feet below the surface; each gall contained two or three larvæ, and during the last few days five specimens of the perfect insect had gnawed their way out; at first a very small hole was visible, through which, when it had been made large enough, a mandible was pushed; the insect continued its gnawing, an antenna was soon protruded, and gradually a perfect Cynips emerged. The whole of the five specimens were females, and

he believed that the whole brood would prove to be of that sex. These phenomena suggested several queries not capable of easy answer: in the first place, how does the Cynips make its way to the surface through the four feet of sand or earth which lies above it? Secondly, how does the parent manage to lay her eggs so deep in the ground? Thirdly, how long are the galls in process of formation? Fourthly, it would seem highly probable, from the observations of foreign entomologists on allied species, that in Cynips aptera (to which the exhibited specimens were very nearly related if not identical therewith) the male comes out in the spring, and in the spring only, whereas here was a brood of females emerging in October. Another peculiar circumstance was that the flies, since their escape from the galls, had made, in the box in which they were confined, a web of considerable tenacity, not unlike that formed by the larvæ of certain Lepidoptera.

Mr. F. Smith considered the specimens exhibited to be the Cynips aptera: in Bishop's Wood the galls might be obtained in any quantity, and he had himself reared hundreds of the fly, but all the specimens were females; he had collected them at all times of the year, and never saw a male: so far as he was aware a male Cynips (*i.e.* of the true genus Cynips of Hartig) had never been observed.

Professor Westwood said that the males of Cynips were described by American authors; the occurrence of an autumn brood consisting of females only had also been noticed, and to the phenomenon of one sex in one brood and the other in another the term "dimorphism" had been applied. The spring brood, however, was said to yield both males and females; the theory was that the females of the autumn brood were agamous, but laid eggs,—that it was a case of parthenogenesis,—but that those of the spring brood were fertilized in the ordinary manner by contact with the male.

Mr. W. W. Saunders exhibited three other kinds of gall which he had found during a recent trip to Switzerland. The first was found on a glaucous-leaved willow, and occurred near the Lake of Brienz: it resembled a small fir-cone, or might even be likened to the flower of a Centaurea: no larvæ were discovered, but traces of their action were visible, and the cause of the excrescences was doubtless a Cynips. The second kind was found in July near Coire, where a dwarf and stunted species of willow was covered with red berries looking like so many red currants; these also were doubtless due to a Cynips. The third kind was formed on the beech, and was an indurated conical gall, so hard as with difficulty to be cut with a knife, but nevertheless made on the leaf of the tree; it was hollow, with a large flat base in which the larva nestled, and was found at Ragatz and at Interlaken and in other parts of Switzerland in July and August.

Mr. Stainton exhibited a gall found on the oak near Bath, the exterior of which was of a woolly texture and of yellowish colour.

Mr. Stainton also exhibited copies of the twenty-one plates designed to illustrate Messrs. Douglas and Scott's forthcoming volume on the British Hemiptera-Heteroptera.

Mr. F. Smith (after mentioning that in a previous letter Mr. Stone had informed him that he had noticed a number of workers of the common wasp busily engaged in carrying young grubs out of the nest) read the following extracts from a letter addressed to him on the 4th of November, 1864, by Mr. Stone:—

"You ask why were the workers of Vespa vulgaris carrying out the young grubs? I have no doubt whatever that it was in consequence of the grubs having become from

some cause or other in a diseased and sickly state; they appeared to be carried to a distance and then dropped, just as is the case at the close of the season when the communities break up. There was a nest of Vespa Germanica close by, and my first impression was that it was by the workers from this nest that the grubs of V. vulgaris were being removed, in order to feed their own larvæ upon them; but having caught several as they emerged, each laden with a grub, I found that that was not the case, but that they were unquestionably the legitimate occupiers of the nest at which they were captured. This nest became a ruin before the end of August, and that of V. Germanica shortly afterwards, thus proving that disease of some kind had attacked both communities.

"Of the sixteen nests of Vespa sylvestris which I obtained, one was situated in the thatch of an out-house, one was suspended from the roof of a temple dedicated to a certain goddess who shall be nameless, one was suspended just inside a rabbit burrow, and the rest were built in a variety of holes in the ground, mostly in banks by the side of ditches or streams of water; several were in holes I had myself formed in banks. Whatever hole they may select they invariably place their nest nearer to the entrance than the other species of underground wasps. In the majority of cases which have come under my observation the nest has in fact been exposed to view, without the trouble of digging for it.

"On opening some closed-up cells appropriated to queens or females in a nest of Vespa vulgaris, I found one larva and one pupa differing in nothing that I could perceive from those of Ripiphorus contained in the cells appropriated to workers, except that they were something like double the size, in fact about as much larger as a full-grown larva of a queen-wasp is larger than that of a worker. Are there two species of Ripiphorus, or a large and a small variety? or if only one, would the large specimens above-mentioned (which I have preserved in spirits) produce Ripiphorus as it ought to be, and are those found in the cells of worker-wasps only starved examples of the beetle?"

Professor Westwood replied that there was but one species of Ripiphorus, the well-known R. paradoxus; there was, however, considerable difference in the size of the sexes, and it would be a singular result if it should turn out that female wasps produced female Ripiphori, whilst the workers produced the males. Since the different food supplied to wasp-larvæ determined whether they should become females or workers, it seemed not impossible that the sex of the parasitic Ripiphorus should depend upon whether its larva fed on queen-larva or worker-larva. With respect to the disease amongst wasps mentioned by Mr. Stone, it was probably akin to the disease amongst bees known as "foul brood:" the cause of this malady was unknown, some supposing that it was attributable to the brood having become chilled, others regarding it as a sort of cholera. But whatever the cause, there was no doubt as to the malignity of the disease: if a hive once became infected, it attacked the honey therein, and bees fed on that honey during the winter became also diseased. The hives of so experienced a bee-keeper as Mr. Woodbury were not free from this plague.

The Secretary observed that it might not be uninteresting to the Society to hear from time to time of the welfare of the various provincial Societies which had been founded with an object identical or cognate with our own. He had recently had the pleasure of assisting at the opening of an Exhibition of Objects of Natural History,

held under the auspices of the Huddersfield Naturalists' Society. Mammals, birds and their nests and eggs, reptiles, fishes, mollusks, insects, herbaria and geological specimens, were contributed by upwards of sixty local exhibitors, the majority of whom were persons gaining their livelihood by manual labour. The stuffed birds formed perhaps the most prominent feature. The insects consisted of eight cases of Coleoptera belonging to four exhibitors, seventy cases of Lepidoptera belonging to ten exhibitors, and ten cases of miscellaneous insects belonging to seven exhibitors; nearly all were indigenous species; one or two curious hermaphrodites were shown (a very complete one of Liparis dispar), and several of the cases contained singularly beautiful varieties of Arctia Caja, Abraxas Grossulariata, and others of the commoner Lepidoptera, which varieties had for the most part been bred by the exhibitors, from the larva. He was informed that the exhibition had been visited by hundreds daily, and had proved a success both financially and otherwise.

Mr. C. A. Wilson, Corresponding Member, under date of Adelaide, August 26, 1864, sent the following:—

Notes on South-Australian Entomology.

"The following is a statement of the comparative number of species of each order of insects found in the Colony of South Australia, and also of the principal families of Coleoptera. Additional species will be continually found in parts which are now for the first time becoming occupied. We are pressing forward both on the eastern and western sides of this continent. By public and private enterprise the country north of Champion Bay is now in the act of being made known. With the aid of the Queensland Government, that to the north of Rockhampton on the north-east coast, up to Rockingham, is also being colonized. Still further on the northernmost part, or Cape York, shooting far away towards the equator, a settlement is being formed by parties from England. And, lastly, by our own Government, the north-west coast near Arnheim's Land is now being surveyed for future occupation, in the neighbourhood of the spot where Stuart's small but adventurous band first saw the ocean after their passage through the till-then-unknown interior from Adelaide. This will still leave almost entirely untrodden the vast tract of country between Arnheim's Land and the Queensland territory, passing by the south shores of the Gulf of Carpentaria, in returning from which the lamented Burke and his party lost their lives; also the equally untried country between the boundaries of our province and that of Western Australia, the northern and central parts of which will probably long remain a sealed book, though the time doubtless *will* come when the unknown shall be so no longer either to the explorer or the naturalist.

"What all these vast tracts will present to us of animal life, in addition to what is already known, it is of course impossible to say, though pleasant to speculate upon. Already from the neighbourhood of the Darling River, north-east of Adelaide, and from Western Australia, various small and quite new species of the Marsupialia are being forwarded to the Curator of our Museum, and new birds, reptiles and insects will follow.

"In a rough but carefully-weighed estimate, after an acquaintance of many years with the insects of this colony, I have come to the following conclusions. Taking the number 20 for the Coleoptera, which have more admirers and have been more carefully

collected hitherto than any other order, the relative value of the seven principal orders of insects in South Australia is as under:—

	Relative number of species.
Coleoptera	20
Hymenoptera	11½
Lepidoptera	6½
Diptera	4½
Hemiptera and Heteroptera	2
Orthoptera	1
Neuroptera	½

"The remaining orders, Thysanoptera, Aphaniptera, &c., have as yet yielded so few species (of Strepsiptera, I believe, no species has yet been found) that I do not notice them here. The number of the Coleoptera would be more nearly attained by each of the three orders which immediately follow, if the latter were more looked after, as in a few of the families of each there are hundreds of minute insects. In the list just given, the Hymenoptera are principally supported by the families Ichneumonidæ and Apidæ; the Lepidoptera by the numerous small moths; the Diptera by the Muscidæ; the Homoptera by the Cercopidæ; and the Orthoptera by the Locustidæ. With the exception of the last, this seems much the same as in European countries.

"The collections of Coleoptera in the Adelaide Museum, in Mr. F. G. Waterhouse's private cabinets, and my own, include by far the greatest number of known South-Australian species. These, with several other small collections, give the following as (in round numbers) the now-known species of Coleoptera and of the seven most numerous families:—

Total number of South-Australian Coleoptera, (say) 5000 species.
These in a few years will probably be nearly doubled.

Principal Families.	Number in Collections.
Curculionidæ	About 600 species.
Chrysomelidæ	„ 450 „
Buprestidæ	„ 300 „
Cerambycidæ	„ 250 „
Carabidæ	„ 200
Melolonthidæ	„ 100 „
Helopidæ	„ 100 „
	2000"

The Secretary, after mentioning that the subject of Dr. Icéry's 'Mémoire sur le Pou à poche blanche' (of which a presentation copy was on the table) was identical with the sugar-cane-infesting Coccus of which specimens were exhibited at the June Meeting of the Society (*ante* p. 25), read a translation of the 'Mémoire.' The following are abridged extracts therefrom:—

"*The Eggs and the Larvæ.*—When the insect, improperly called a 'louse,' is examined on the plant where it has fixed itself, two distinct parts may be remarked,

different in consistency and in colour; one, somewhat flattened transversely, of oval form and of a brown shade, is the insect itself; the other, rounded, formed of a sort of silk or white wool, constitutes the envelope of the pouch which secretes a considerable quantity of very small yellowish grains, adhering together by means of a filamentous substance similar to that which forms the envelope of the pouch. This substance, to which a sugary taste has been attributed, seems, on the contrary, to be very irritating; placed on the mucous membranes it excites a violent inflammation. The small yellowish grains are the eggs, the number of which is variable, according to the more or less favourable conditions attending their production. They are of oval shape and ·28 of a millimètre in their longer diameter. The mean quantity found in a pouch cannot be estimated at less than 100 to 125. The hatching of the eggs begins at the periphery of the pouch, the circumference of which is soon afterwards torn by the first larvæ which appear. The gnawing of the pouch by ants, which are greedy in pursuit of it, rapidly effects the exit of the young 'lice' and their dispersion over the surrounding parts. It is only at the end of several days that all the larvæ have burst through the filamentous matter, and abandoned the pouch which sheltered them. At this time, the mother is almost dried up and looks like a brownish scale. At the moment of detaching itself, the larva is still surrounded by a film of the filamentous substance, which by its lightness and the surface which it opposes to the breeze easily explains the carriage of the insect for great distances by means of currents of air. Its oblong body is from front to back ·4 millim. in length; with three pairs of long and slender feet, the tarsus of which is formed of five joints, and ends in a sort of claw which issues from between two long hairs. The abdomen at the posterior and median part has a deep slit, which passes beyond two small tubercles, on which are implanted two long filaments directed horizontally backwards, and which have a slight curvature. The head has on either side a round and prominent eye, and is armed with two long antennæ bristling with short and slender hairs. This larva is scarcely perceptible to the naked eye; it requires a strong lens to see it distinctly. As soon as it leaves its mother's pouch, it seeks a place suitable for fixing itself. It is curious to see the activity which these small animals then display; as quick in their movements as ants, they run from side to side, and spread themselves over the neighbouring leaves, which they seem to study with care until they meet with the wished-for conditions for establishing their new abode.

"One remarkable circumstance peculiar to this insect is, that instead of improving as it is developed, as takes place for the most part with other larvæ, it on the contrary gradually loses its primitive qualities, and at the end of some days transforms itself in a manner not easy to be known again. Its tail and antennæ fall off, its feet waste away, its head becomes less distinct, its body grows round; and soon, incapable of performing the slightest motion, it presents itself under the guise of a small whitish and transparent body adhering closely to the leaf on which it has fastened itself. This transformation, at one time slow, at another rapid, is dependent on the greater or less facility which the larva meets with in finding a favourable locality, the object of its active search. Thus withered leaves, exposure of the plant to a current of air, are causes which retard the transformation; whilst a suitable exposure, tender and green leaves, on the contrary, have the effect of making it more rapid. But, in any case, it is only at the end of several days that the larva begins to undergo the modifications of which we have just spoken.

"Another particularity worthy of remark, and which is of paramount interest to us, is the resistance which this larva offers to the ordinary means of destruction likely to reach it. I have plunged it in water for twenty to thirty minutes, and at different times, without being able to kill it. As soon as it had freed itself from all moisture it resumed its habitual mode of procedure, and seemed to have lost none of its agility. And what is astonishing, acetic acid (concentrated vinegar) and ammoniac acid are equally powerless over it. Alcohol, on the contrary, acts on the insect with fatal promptness. To kill it, it is sufficient to touch it with the tip of a point which carries a small drop of spirits of wine. This property might be made use of in opposing the insect, by employing, to wet the leaves of the young canes which are attacked, the fermented liquids which it is so easy to obtain in every manufactory. Strongly odoriferous substances and oil of naphtha, mixed in small quantities with liquids of inferior quality, may also be utilized in the same manner, and render excellent service. The sulphurous solution which is obtained when a mixture of sulphur and lime is boiled in water, would likewise produce a favourable result in destroying the 'louse,' if it were applied on a large scale. These are different substances, all injurious to the insect, capable of easy employment, and to which it is sufficient for me to call attention.

"I was unwilling to speak of the larva without indicating summarily the means which have appeared to me the most suitable for opposing it; because it is at this period of its existence that it can be profitably and easily got at; later on, the remedy will have lost its chief quality, that of preventing the adherence of the insect to the leaf, and the mischief will have already been done.

"*The Female.*—The female is the 'white-pouched louse,' in the most general and common acceptation of the term; it is she, in fact, that has been so designated, and it is she only with which the planters are acquainted. She appears at first on the leaves of the sugar-cane like a white dot, of a size and transparency such that she escapes a rapid examination, even by persons accustomed to recognise her. The hinder half of the body is surrounded by a white circle formed by the secretion of the filamentous wool which always precedes oviposition and accumulates as the eggs are laid.

"Three weeks are generally sufficient for the accomplishment of the laying of the eggs. The hatching soon follows; and the young 'lice,' before quitting their nest for good, often return under the roof offered them by their mother, whose body, even after death, still shelters and protects them. The feet of the female insect disappear or wither away, and later on dry up in contact with the abdomen, where they may be found for a long time in the form of yellow and tough fragments. No trace exists of the antennæ and tail, and the eyes are indicated only by two very small black dots placed on either side the head, which merges in the body. The general form of the insect is then elliptic, flattened on the abdominal side, and projecting from front to rear on the median dorsal line. At its circumference the body, except in the rear, where there is a deep slit, is thin and armed with filaments which serve to make it adhere firmly to the leaf of the plant. In front these filamentous appendages, to the number of four or five, often acquire a considerable length, and are doubtless designed to facilitate suction. The mouth is a snout (*une trompe*), which extends beyond the head and bends downwards; I have not been able to analyse the different elements of which this snout is formed. The digestive tube, which runs from the mouth, ends in front of the posterior abdominal slit in a sort of *cloaca*, a vast cavity which affords an outlet for the excrementitious matters and the eggs. The abdomen is covered with transverse folds, which become very manifest, and execute concentric intermittent movements

during the whole duration of the egg-laying. The whole abdominal tegument is furnished with glandular follicles, designed for the secretion of the white matter; that of the back is, on the contrary, perfectly smooth. On each side of the anterior part of the body may be seen a pair of orifices communicating with some transverse conduits, which inside divide themselves into branches; these are the stigmata and air-bearing canals, which constitute the respiratory apparatus of the insect. The small round bodies disposed in pairs on the lateral parts of the abdomen show the nervous ganglions, of which three very distinct pairs may ordinarily be recognized. The female is apterous.

"It may be remarked that the female, however different its aspect from that of the larva, does not undergo what is conventionally called a complete transformation; it is quite different with the male, which after the first modification experiences a complete metamorphosis. As soon as the female has adhered to a leaf, plunging into it its sucker and its filamentous appendages, she provokes in the nutritive functions of the plant a disturbance which is the more manifest as the vegetation is less active. Thus, as I have said above, the best remedy will be that which reaches the larva, or at least the female, before the latter is closely fastened to the plant upon which she has established herself.

"*The Male.*—The larva from which the male proceeds is not distinguishable from that of the female on its exit from the cottony down which forms the mother's nest. The similitude of all the young ones has always appeared to me to be perfect up to the moment when the fall of the antennæ and of the tail indicated the beginning of the modifications which the insect was about to undergo. In this stage, the male larva is denoted by the slightly brown coloration which it puts on, and the rigidity which contracts its teguments. Whilst the female grows rapidly, preserving for a long time its primitive white colour and its transparency, the male seems to progress less quickly, and in some days becomes hard and blackish. It is then found fixed at intervals on the leaves, looking like a dot whose very decided colour at once reveals its presence. Examined with the microscope, it exhibits the structure already described as that of the female, but the whole of its tegumentary envelope is nothing more than a shell, which harbours in its median part a small gelatinous and transparent body, whose rings, head and tail recall the larva of the Lepidoptera; this is the larva of the male 'louse,' which soon veils itself (*se voile*), increases in consistency, becomes of a deep brown and changes to the nymph. When the male has undergone its metamorphosis, it pierces the shell and emerges from it by a hole contrived about the centre of the envelope. It is a very small winged insect, 1½ millimètre long, of thin and elegant form, with rapid and abrupt movements; its body is of a beautiful metallic black, its thorax has a large green disk, and its wings present brilliant red and violet reflexions when the light of a lens is projected obliquely upon them. Its head is adorned with facetted eyes, and with two antennæ, which are relatively long and stout, formed of seven joints. It has three pairs of feet, whose tarsi are surmounted by a sort of slender spur. The tarsi are formed of five joints, and the first of these joints is as long as the four others taken together. Its wings, which are membranous throughout their whole extent, are four in number, and overlap each other laterally. The wings of the first pair are much larger than those of the second pair, which they overlie on all sides. The posterior part of the abdomen presents an orifice with whitish edges, and by the side of it is found a retractile projection surrounded by some long and rigid

hairs. This little insect ordinarily remains on the plant where the females have fastened themselves, and uses its wings only to skip short distances. Scarcely has it quitted the shell in which its metamorphosis has been produced than it runs rapidly over the leaves which bear the females, and, passing them in review successively, approaches each of them, performing each time regular and uniform movements. With head erect, wings half spread, and abdomen bent down behind, he hastily mounts the back of the first female he meets, and after stopping there an instant, he faces about, and with equal ardour rushes upon each of the females who may be nigh. The number of males is much less than that of females; I believe that the males do not form more than the tenth part of a whole brood.

"The characters enumerated above induce me to arrange this insect in the order Hemiptera, and to place it amongst the Homoptera in a genus of the family of Gall-insects. I would propose to call it Gasteralphe, a name which perfectly designates the most prominent peculiarity of its external form."

Professor Westwood remarked that it was perfectly clear, from the description and from the plates, that the insect which Dr. Icéry supposed to be the male of the Coccus was not a Coccus at all; it was a species of Coccophagus, a Hymenopterous (Chalcidític) parasite upon Coccus. The female described was doubtless a true Coccus, the male of which was, he presumed, still unknown. The action which the author had mistaken for the impregnation of the female Coccus was, in fact, the deposition of the eggs of the female Coccophagus in the body of the Coccus. Dr. Icéry's observations on the effect of different fluids on the larvæ were very interesting, particularly as to the powerlessness of water and the rapid action of spirits of wine, which might be explained by the fact that the downy matter surrounding the larvæ, being of the nature of lac, was insoluble in water and soluble in spirit.

Mr. W. W. Saunders mentioned that for some years he had used spirits of wine in his greenhouses for cleansing plants and clearing them from insects; he mixed the rectified spirits and pure water in equal proportions, and this mixture, which was found to answer better than undiluted spirit, was applied with a brush. It was very efficacious in the destruction of the common mealy bug (especially when young) and other common pests, and he recommended it as worthy of application in the greenhouse generally.

Professor Westwood called attention to the Report of a Commission which had been appointed by the Committee of Council for Education to enquire into the causes of decay in wood carvings, and the means of preventing and remedying the same. The insects which in this country were found to be the most injurious, from their habit of burrowing into the wood of furniture, were three beetles of the family Ptinidæ, *viz.*, Ptilinus pectinicornis, Anobium striatum and A. tessellatum. Numerous experiments had been made with carbolic acid, chloroform and benzine, specimens of furniture attacked by the worm being submitted to the action of the vapour of these different substances; other specimens were saturated with corrosive sublimate dissolved in methylated spirits of wine. The conclusions at which the Commission arrived were (1), that the action of the worm may be arrested and the worm itself destroyed by vaporization, more especially by the vapour of benzine; (2), that carved work may be completely restored by an injection of vegetable gum and gelatine, in order to fill up

the worm holes and strengthen the fabric of the carvings ; and (3), that after the worm has been destroyed, further attacks from it can be prevented by treating the carved work with a solution of corrosive sublimate, either in methylated spirits of wine or parchment size, according to the character of the surface of the wood-work ; the strength of the solution being sixty grains of chloride of mercury to a pint of fluid, whether methylated spirit or parchment size.

Paper read.

Mr. J. S. Baly read a paper entitled " Descriptions of new Genera and Species of Phytophaga," in which sixteen new species were described, and four new genera established under the names of Euphæne, Sophræna, Nisotra and Glycernia.

December 5, 1864.

F. P. Pascoe, Esq., President, in the Chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Catalogus Specierum Generis Scolia,' conscripserunt Henricus de Saussure et Julius Sichel ; presented by the Authors. 'Elatérides Nouveaux,' par M. E. Candèze ; by the Author. 'Tijdschrift voor Entomologie,' Vol. vii. Parts 1—5 ; by the Entomological Society of the Netherlands. 'Sepp, Nederlandsche Insecten,' 2d Series, Nos. 35—46 ; by S. C. Snellen van Vollenhoven, Esq. 'Synopsis des Agrionines, 4e légion : Platycnemis,' par M. Edm. de Selys-Longchamps ; by Dr. Hagen. 'Die wirbellosen Thiere der Provinz Preussen' ; 'Die Odonaten und Neuropteren-Fauna Syriens und Klein-Asiens ;' by the Author, Dr. Hagen. 'The Journal of Entomology,' No. 11 ; by the Proprietors. 'The Zoologist' and 'The Entomologist' for December ; by the Editor. 'The Entomologist's Monthly Magazine,' No. 7 ; by the Editors. 'The Journal of the Society of Arts' for November ; by the Society. 'The Reader' for November ; by the Editor. 'The Athenæum' for November ; by the Editor.

The following additions by purchase were also announced :—Voyage de Découvertes de l'Astrolabe—Partie Entomologique, par le Docteur Boisduval ; Fabricius (J. C.), Species Insectorum ; Paykull (G.), Fauna Suecica, Insecta ; Paykull (G.), Monographia Staphylinorum Sueciæ ; Paykull (G.), Monographia Caraborum Sueciæ ; Gravenhorst (J. L. C.), Coleoptera Microptera Brunsvicensia nec non Exoticorum quotquot exstant in Collectionibus Entomologorum Brunsvicensium ; Percheron (A.), Monographie des Passales ; De Laferte-Senectére (F.), Monographie des Anthicus ; Sturm (Jacob), Catalog der Kaefer-Sammlung ; Catalogue de la Collection Entomologique du Muséum d'Histoire Naturelle de Paris, par MM. Milne-Edwards, Blanchard et Lucas ; Fairmaire (Léon), Essai sur les Coleoptères de la Polynésie ; Fallen, Monographia Cimicum Sueciæ.

Election of Members.

The Rev. Herbert Milnes, of Crich, near Matlock ; William Hume, Esq., of 9, Gracechurch Street, London ; and Trovey Blackmore, Esq., of The Hollies, Wandsworth, were ballotted for and elected Members of the Society.

Exhibitions, &c.

Mr. J. Jenner Weir exhibited some microscopic preparations of the spiral tongues of butterflies, for the purpose of showing the diversity of striation of the spiral tongue in different species, and of certain papillæ existing at the end of that member; the papillæ in Vanessa C-album were very different from those of the closely-allied species of Vanessa, whilst in the genus Argynnis they were found to be extremely brittle.

Mr. Bond exhibited a coloured drawing, by Mr. Buckler, of the larva of Acronycta strigosa, feeding on hawthorn; and a photograph of a remarkable negro variety of Abraxas Grossulariata.

The Rev. H. Clark exhibited a collection of Coleoptera made by Mr. Pickard-Cambridge above Cairo.

Mr. W. F. Evans sent for exhibition a box full of Lamellicorn beetles, or fragments of beetles, which had been picked out of some New Zealand wool; in some of the fleeces there were thousands of them. He inquired whether the beetles were in any way parasitic on the sheep, or sheep-tick feeders, or how they came to be in the wool? Mr. McLachlan said that thousands of the beetles occurred also in Australian fleeces. Mr. Janson determined the species to be Pyronota festiva; he believed that in the course of their flight the insects came in contact with the sheep, and became entangled in the wool so as to prevent their escape.

The President exhibited some globular spiders' nests from South Australia, whence they had been sent to him by Mr. Odewahn, of Gawler. The nests were found on branches of trees; the spiders were hanging near them, and were described as looking like the excrement of a bird, or as resembling the Longicorn beetle Onychocerus Scorpio, whilst the nests bore a remarkable resemblance to the fruit of Leptospermum, one of the Myrtaceæ, the native tea-tree of Australia.

Mr. S. Stevens exhibited several pairs of Cheirolasia Burkei, one of the rare Goliath beetles, recently received from Africa; and read a letter addressed to him by M. Du Chaillu, dated Fernand-Vaz River, 20th August, 1864, in which the writer announced the despatch to London of a large collection of insects, a live gorilla, and a number of gorilla-skins and skeletons; he intended to start in a few days for the interior, and would probably remain two years. Mr. Stevens mentioned that the gorilla had died on its passage to this country, but the collection of insects had arrived, and some of the Coleoptera were exhibited, including four or five species of Goliath beetles, G. Savagei, G. Sayii, G. torquatus, G. micans, &c.

Mr. F. Smith exhibited a parti-coloured wasps' nest belonging to Mr. Stone, of Brighthampton. Mr. Stone had a nest of Vespa Germanica in a window on the ground-floor, and in a corresponding position in the first-floor window, immediately over the other, was a nest of Vespa vulgaris; his attention was called to the nest on the ground-floor by the different colours of different parts thereof, some of which were found to be constructed of decayed wood, such as would be used by the common wasp, but not by Vespa Germanica. Examination showed that the lower nest owed its construction to the united labours of both species of wasps, the different material employed by each determining the colour of the portion built by that species. Further observation proved that specimens of the common wasp, when returning homewards with a low flight, entered the nest of V. Germanica, apparently by mistake, and deceived by the similarity of situation of the two nests.

Mr. F. Smith also exhibited the large larva and pupa of Ripiphorus, found in queen-cells of the common wasp, referred to at the previous meeting (*ante*, p. 49), and read the following communication from Mr. Stone :—

" It is certainly not the fact that female Ripiphori are found exclusively in female cells of wasps, and males in those of workers ; for I have bred scores upon scores of both males and females from the cells of workers ; nor can I perceive any very great difference in the size of the sexes, although the females are unquestionably somewhat larger, and much more plump in appearance, than the males ; still there is nothing approaching the vast disproportion in size which exists between full-grown larvæ found occupying the cells of queens and those found in the cells of workers. The former must produce specimens of gigantic size. Then there must either be two distinct species, or there must be a permanently large and small variety, the former invariably depositing its eggs in the cells of queens, the latter in those of workers ; or, if there is only one species, and no permanent variety of the insect, it must be that the difference in size arises solely from the fact that some larvæ have been placed, or by a piece of good luck have placed themselves, in a situation in which they have met with an abundant supply of food, thus enabling them to attain the full and proper size, and so produce *Ripiphorus as it ought to be ;* while the others must be looked upon as diminutive examples of the insect, dwarfed and stunted by the limited and insufficient supply of food allotted to the larvæ from which they were produced. May I direct Prof. Westwood's attention to page 294, vol. i., of ' An Introduction to the Modern Classification of Insects' ? He will there find the following statement :—' The larger specimens of the Ripiphorus paradoxus, which are much more rare than the smaller ones, are uniformly found only in the cells of female wasps.' This statement appears to be made on the authority of the Rev. F. W. Hope, and from it I think may be plainly seen that that gentleman did not consider these large examples to be exclusively females, and the smaller ones, bred in the cells of workers, exclusively males."

Mr. Smith remarked that, according to Mr. Hope's experience, the Ripiphorus was found only in the nests of Vespa rufa, whereas Mr. Stone never found it in the nest of Vespa rufa, but only in that of V. vulgaris. Prof. Westwood thought this apparent discrepancy probably arose from some mistake in the nomenclature or synonymy of the species of wasp, rather than from an actual difference of habit of the Ripiphorus in different localities.

Mr. W. F. Kirby read the following :—

Notes on the Synonymy of certain British Butterflies.

" The following notes on priority are taken chiefly from Staudinger's Catalogue.

" Genus Pyrameis, *Hüb.*, *Doubl. & Hew.*—This genus, which can be immediately distinguished from Vanessa by the rounded and scalloped hind wings, contains a number of very closely-allied species from different parts of the world, and forms an exceedingly natural group. It is admitted by many writers on exotic Entomology ; but our European writers generally place the only two European species (Pyrameis Atalanta and P. Cardui) under the genus Vanessa. I think that so natural and well-marked a genus should be universally admitted.

" Genus Melanagria, *Meigen* (Arge, *Esp.*, *Hüb.*, *Bd.*) — This genus contains the group of Hipparchiæ represented in England by Melanagria Galathea. The name

Arge is inadmissible, because it is the specific name of one of the European species. Those who adopt the name Arge for the genus employ for the species Amphitrite, a name subsequently given to it.

"Erebia Epiphron, *Knoch* (Cassiope, *Fab.*) — If Staudinger is right in referring Erebia Epiphron and E. Cassiope to the same species, the latter name must sink, as Epiphron has the priority by ten years.

"Erebia Medea, *W. V.* (Blandina, *Fab.*) — The name Medea should be retained, as it has a priority of seventeen years.

"Polyommatus Medon, *Hufnagel* (Agestis, *W. V.*) — The former name has a priority of ten years, and should be retained.

"Polyommatus Icarus, *Rottemburg* (Alexis, *W.V.*) — The name Icarus has a slight priority, but that of Alexis is extremely objectionable, as there is an East Indian species of Stoll's (Ælianus of Fabricius) bearing that name. The British species in question need not be confounded with the Icarius of Esper, a European insect, as we can adopt Schneider's name Amandus for that, as, if the two names are not simultaneous, it is probable that Schneider's has the priority.

"Polyommatus Semiargus, *Rottemburg* (Acis, *W. V.*) — Rottemburg's name has a slight priority over the other.

"Pyrgus Malvæ, *Linn.* (Alveolus, *Hüb.*) — Both Wallengren and Staudinger agree with Westwood in assigning Linnæus's name to this insect. Illiger's P. Malvarum, to which Linnæus's description is generally referred, does not appear to occur in North Europe at all.

"Genus Cyclopides, *Hüb.* (Steropes, *Bd.*) — Boisduval's name is quite inadmissible, as it is the specific name of the type of his genus, for which he uses the name Aracinthus, given to the insect eighteen years after the former one. His genus Syrichthus (Pyrgus, *Hüb.*) is also objectionable, as it is the Fabrician synonym of the North American Oileus of Linnæus, a species most certainly belonging to Boisduval's genus Syrichthus."

Papers read.

Mr. W. C. Hewitson communicated "A Monograph of the Genus Ypthima, with Descriptions of two New Genera of Diurnal Lepidoptera." The new genera Cœnyra and Xöis consist each of a single species — Cœnyra Coryeia, from Natal; and Xöis Sesara, from Fiji. Of Ypthima twenty-four species are enumerated, of which seven are new, viz., Y. Inica (East India), Y. Itonia (White Nile), Y. fasciata (Sarawak, Sumatra), Y. Ceylonica (Ceylon), Y. Loryma (Macassar, Celebes), Y. Methora (North India), and Y. Sepyra (Gilolo, Batchian).

Captain Hutton, of Mussooree, N.W. India, communicated a paper "On the Reversion and Restoration of the Silkworm." In this, the concluding part of a former communication to the Society (see 'Transactions,' 3rd series, ii. 143), the author details the progress of his experiments during 1864, with a view to the restoration of the silkworm to its pristine state of health. The selected black worms were hatched on the 21st March, some of the eggs having been laid in the spring and others in the autumn of 1863; all were decidedly unhealthy, the autumn batch less so than those of the spring; the latter were so terribly afflicted with jaundice, and with some disease that turned the worms dull green, that the whole of them had to be thrown away. The worms from the autumnal batch of eggs went on satisfactorily and spun good cocoons, the moths from which deposited a goodly number of eggs at the end of May, and these began to hatch for a second crop in September. With a few of this brood the author

expresses his intention of carrying on his experiments for amusement, but he now feels fully persuaded that the constitution of the worm has been so thoroughly undermined, that, although it may be restored to its natural appearance, it will never be able to shake off the various diseases to which it has so long been subject. The only way open to the sericulturist is therefore to re-seek, in the original habitat in China, for the wild worms in their natural state of freedom on the trees, and, should any be procurable, the entire stock in Europe may be gradually renewed. The author, after arguing at length against the opinion of Indian sericulturists that the several forms of domesticated silkworms are but varieties of a single species, then proceeds to evolve eighteen silk-producing species of Bombycidæ, twelve belonging to the genus Bombyx (six domesticated and six wild species), five belonging to the genus Ocinara, the remaining one being the Trilocha varians of Moore.

New Part of 'Transactions.'

A new Part of the 'Transactions' (Third Series, vol. ii. Part 3) was announced as ready for distribution.

January 2, 1865.

F. P. Pascoe, Esq., President, in the chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—Hewitson (W. C.), 'Exotic Butterflies,' Part 53; presented by W. W. Saunders, Esq. Bates (H. W.), 'The Naturalist on the River Amazons,' 2 vols.; by J. W. Dunning. 'The Entomologist's Annual for 1865'; by H. T. Stainton, Esq. 'The Zoologist' and 'The Entomologist' for December; by the Editor. 'The Entomologist's Monthly Magazine' for December; by the Editors. 'The Journal of the Society of Arts' for December; by the Society. 'The Reader' for December; by the Editor. 'The Athenæum' for December; by the Editor.

The following addition by purchase was also announced:—Gerstaecker (A.), 'Bericht über die wissenschaftlichen Leistungen im Gebiete der Entomologie während des Jahres 1862.'

Election of Members.

Edward Saunders, Esq., of Hillfield, Reigate, was elected a Member of the Society; M. H. Hartogh Heys van de Lier, of Delft, was elected a Foreign Member; and Mr. James A. Brewer, of Newgate Street, London, was elected an Annual Subscriber.

Exhibitions, &c.

Mr. Bond exhibited a fine series of Ephestia ficella, bred from cork; specimens of Depressaria olerella, a species recently added to the British list, and captured by Mr. C. G. Barrett near Haslemere; and some remarkable examples of Hepialus Humuli, captured during the past season by Mr. Rich, at Lerwick, in the Shetlands. Of the last mentioned, some more extraordinary specimens from the same source had been placed in the British Museum; the males, instead of having their anterior wings

(as hitherto universally known) of an unicolorous white, varied from dull white to orange-brown and even brownish black, and the majority of them exhibited all the markings usually found on the anterior wings of the females; the ground colour of the females was in some cases dull orange-brown, in others dull dirty white. Thus each sex appeared in the garb of the other. The number of the typical form of the insect was a small fraction of the total number captured; and but for the occurrence of the few normal specimens, the variety would doubtless have been regarded as a completely distinct species.

Mr. A. R. Wallace exhibited some Longicorn beetles collected by Mr. James Lamb at Penang and in the province of Wellesley. Mr. Lamb had collected Coleoptera in that locality during the last four years, and amongst his captures were a couple of hundred species of Longicornia, of which upwards of seventy were laid before the Meeting, nearly the whole of them being new to Science; many were referrible to genera discovered by Mr. Wallace in Borneo and Singapore, whilst others were more nearly allied to the forms occurring in Siam.

The Rev. Hamlet Clark (on behalf of the Rev. O. Pickard-Cambridge, who was present as a visitor) exhibited a collection of Lepidoptera (including Micro-Lepidoptera), Hymenoptera and Orthoptera from the banks of the Nile. Mr. Cambridge remarked that insect-life was not abundant in Egypt; the specimens exhibited included every Micro-Lepidopteron which he saw. He also called attention to the seed-pod of a Cassia, from which had emerged a Lycæna; but the pod had not been opened, so as to show the pupa.

The Secretary read the following extract from a letter addressed to him by Mr. Roland Trimen, dated Cape Town, November 12, 1864:—

"I observe in the Report of Proceedings on March 7th, 1864, p. 10, that Professor Westwood described as a new species a butterfly from the Zambesi, under the title of Charaxes Argynnides. There can be no doubt whatever that this insect is Nymphalis Jahlusa of my 'Rhopalocera Africæ Australis' (Part I. p. 177), as I have carefully compared Professor Westwood's description with my own and with specimens of N. Jahlusa, and have examined an example of this butterfly brought from the Zambesi by a member of the mission party. The resemblance which this Nymphalis, in coloration and marking, bears to the species of Argynnis is, as the Professor states, very remarkable, and is noticed in my Catalogue (p. 178). It is singular, however, that no true Argynnis has been taken in South-Eastern Africa, the only Fritillary known to inhabit the region being Atella Phalanta, which has no silvery spots on the under surface of the wings; so that the silver-studded Jahlusa can hardly be held to present one of those remarkable cases of mimicry which have been lately shown to be not uncommon amongst butterflies. The markings of the upper surface, however, correspond very nearly with those exhibited by Atella Phalanta."

Mr. Dunning mentioned that the Rev. J. Collins, of Shepley Parsonage, near Huddersfield, had recently captured in that neighbourhood a considerable number (fifty or sixty specimens) of Dasypolia Templi; they were found in quarries, amongst loose stones, in the ruins of old houses, or in heaps of stones by the road-side, &c., and were generally very snugly ensconced, resting on the under side of the stones. The time of capture was the end of November and beginning of December, which, however, was too late in the season, for very few males were found, and those were generally dead. The specimens varied in colour, some having a yellowish tinge, others being brown or nearly black; and it was necessary to leave them for a long

time on the setting-board in order that the wings might become stiff. Mr. Collins further mentioned that on two or three occasions he had found some eggs, which he thought might prove to be those of D. Templi; and that he inclined to the opinion that, in some cases at least, the food of the larva was the common ling or heath, or the small sorrel.

Mr. F. Smith communicated the following notes by S. Stone, Esq., F.S.A.:—

Wasps and their Parasites in 1864.

"The year 1864 will long be remembered, on account of the magnificent weather which prevailed throughout the whole of the spring, summer and autumn; the abundance of fruit of almost every kind, and the extraordinary number of wasps which were observed throughout the country. These insects made their appearance and commenced their labours at an earlier period than I ever knew them do before.

"On the 23rd of April I removed, from a chamber I had formed the year before, a small nest of Vespa germanica. It consisted of a foot-stalk with four cells depending from it, two of which contained eggs, while above them a small umbrella-shaped covering had been formed.

"During the season I have had opportunities of removing and thoroughly examining one hundred and ten nests, *viz.*, forty-five of Vespa germanica, twenty-seven of V. vulgaris, twenty-one of V. rufa, sixteen of V. sylvestris, and one of V. crabro. Of these I have preserved a fine series, from specimens the work of two or three hours, to those which have occupied as many months. I have also a series of most odd-looking nests constructed by the workers of various colonies when the original nests to which they belonged had been taken away.

"On the 30th of April I took out of a chamber I had constructed a few weeks before a second nest of V. germanica: two coverings were in progress, and twelve cells had been formed, most of which contained eggs. No sooner had this nest been removed than the queen wasp set about the construction of another in the same chamber, which I removed on the 2nd of May, when she immediately commenced building a third, but a drenching and continuous rain which came on caused her to desert this nest, which I removed on the 4th.

"On the 2nd of May I also removed from another chamber I had formed a small nest, or rather the commencement of one, of V. germanica. It consisted of a single cell at the extremity of a foot-stalk. At 1 P.M. this cell was empty; at 1h. 30m. an egg was found to have been deposited in it. At 4 the specimen was removed, while the queen wasp was out collecting building materials. On her return with the materials she had procured she employed them in laying the foundation of a fresh nest in the same chamber, which, in consequence of the rain above mentioned, was deserted the next day. It consisted of a single cell with foot-stalk.

"Between the above date and the 22nd I removed, from chambers I had formed, eight small nests of various species, which had become deserted in consequence of damp, or the attacks of enemies, among which the centipede appeared to take a prominent part. Underneath two of the number a female or queen wasp was found lying dead; but whether they were those belonging to the nests, or strangers, is uncertain.

"On the 27th of June I took out of the head of a felled pollard elm a small deserted nest of V. crabro, which was commenced on the 9th. It consisted of a foot-stalk, to which were attached eighteen cells, some containing larvæ about one quarter

grown. A basin-shaped covering, two inches and a half in diameter, was formed over the cells. It appeared to have been deserted about a week.

"On the 29th I took out a nest of V. rufa, which was in a very forward state, both males and young queens having been produced in it. The crown was studded with eggs of a species of Volucella.

"On the 11th of July I took out a rather small nest of V. rufa, in which I found two females of Anthomyia incana in the act of depositing their eggs.

"On the 14th I took out a small nest of V. rufa, built by the workers left behind when the original nest to which they belonged was removed on the 22nd of June. It measured but about an inch in diameter, and contained one small comb, in the cells of which were found eggs, larvæ of various sizes, and a few spun-up larvæ or pupæ.

"On the 18th I observed the workers belonging to a nest of V. vulgaris bringing out the larvæ, some only about half-grown, which they carried to a distance and then dropped, just as they are in the habit of doing at the close of the season when the communities break up—a proof that at that time the colony was in anything but a healthy state. This nest was close to one of V. germanica. The former became a ruin before the end of August, and the latter soon afterwards; thus proving that disease of some kind had attacked both communities.

"On the 1st of August I took out a nest of V. sylvestris. It was suffering from the attacks of a species of Acarus, which infested it in countless numbers: a female of Anthomyia incana was also found in it in the act of depositing her eggs. I also took out a small nest of the same species built by a few workers belonging to one I had removed on the 16th of July: the present specimen was a very rough-looking object, it having been built among the tangled roots of the common couch-grass: it contained many pupæ or spun-up larvæ, besides eggs, and larvæ of various sizes. On the same day I took out one of V. germanica, which had been constructed by workers from a nest removed on the 16th of July: it consisted of a small comb with a hood-shaped covering: in some of the cells were very small larvæ; in the rest eggs only. I also took out a nest of V. rufa built by workers belonging to one removed on the 15th of July: it was a most singular-looking nest, in shape very like a mole (*Talpa vulgaris*), and of much about the same size.

"On the 2nd I took out a nest of V. sylvestris, constructed by workers from one removed on the 11th of July: it contained great numbers of pupæ, as well as larvæ of various sizes, and some few eggs. The larvæ were suffering greatly from the attacks of an Acarus, which, by sucking their juices, had reduced them to a deplorably emaciated state, so that the destruction of the entire brood must, from this circumstance alone, have speedily ensued. On that day I took out a nest of V. germanica, constructed by workers belonging to one I had removed on the 4th of July. A queen of the species had by some means contrived to introduce herself into this nest, where she had become domiciled: it measured about three inches one way and two inches the other. On the same day I took out a nest of V. rufa, produced by workers from one removed on the 16th of July: it was very small, measuring but two inches and a half in length by one inch in breadth: it contained a few spun-up larvæ, beside eggs, &c.

"On the 16th I brought home combs belonging to a nest of V. vulgaris, into which, through the aperture leading to it, the gardener at Cokethorpe Park had, a few evenings before, poured a quantity of gas tar. On opening the closed-up cells I found

several pupæ of the parasite Ripiphorus paradoxus, and numbers of the perfect insect, both male and female, but could not detect the presence of a larva.

"On the 19th I was more fortunate, for on taking out a nest of V. vulgaris and proceeding to open the closed-up cells, I found a larva of the parasite firmly attached to the full-grown larva of the wasp; the mouth of the former buried in the body of the latter just below the head; its neck bent over that of its victim, whose body appeared to be tightly compressed by that of its destroyer, showing the latter to be possessed of a considerable amount of muscular power. It was of minute size when discovered, and appeared to have only very recently fastened upon its victim; but so voracious was its appetite, and so rapid its growth, that in the course of the following forty-eight hours it attained its full size, having consumed every particle of its prey with the exception of the skin and mandibles, which, from observations I have since been enabled to make, these creatures retain in their grasp even after they have passed into the pupa state. They scarcely appear to cease eating, except now and then for a minute or so, from the time they first begin to feed till they have become full grown. The larva is a singular-looking one. The head is bent forward under the body. Between the segments it is more deeply furrowed than any larva with which I am acquainted. A longitudinal furrow extends down the back from the head to the anal extremity, cutting each segment across. The skin, during life, throughout the whole course of this furrow, is perfectly transparent, so that the workings of the internal organs may be plainly seen. The body of the larva while alive has the appearance of a thin transparent skin filled with minute particles of curd. These appearances vanish after death, when the body becomes dense, and has an appearance of solidity about it which it had not before. Several pupæ of the parasite were found in the nest, as well as examples of the perfect insect. It also contained a number of cocoons spun by the larvæ of Anomalon vesparum, with the larvæ still unchanged inside the cocoons.

"Between the above date and the 3rd of September I took out thirteen more nests of V. vulgaris, which contained examples of Ripiphorus either in the larva, pupa or perfect state. In one which had been destroyed by means of gas tar a few days before I took it out, I was fortunate in discovering a small larva of Ripiphorus firmly attached to its victim. Both were dead and had become partially dried, so that when immersed in spirits they did not separate, but remained attached just as they were before death. These are interesting, because in them may be seen the exact way in which the parasitic larva fastens on its prey. In another, which I took out on the 2nd of September, I found, on opening some closed-up cells appropriated to queens, one larva and one pupa, which differed in nothing that I could discover from those of Ripiphorus found in the cells of workers, except that they were something like double the size; in fact, about as much larger as the larvæ and pupæ of queen wasps are larger than those of workers (*ante*, pp. 49, 58).

"Until the present summer I had not met with a specimen of Ripiphorus since the year 1859, although I had made diligent search for it every succeeding summer. What had become of it all that time, and how it was that all at once it made its appearance in such numbers, are questions more easily asked than answered. Where it occurs it appears to be very local, for I have never met with it except in one particular part of Cokethorpe Park, within a space of ground about four furlongs in length by two in width. I have searched yearly for it in nests obtained from other parts of the park and the surrounding neighbourhood, but always in vain.

"In one nest of V. vulgaris, which I took out on the 24th of August, I found, in addition to examples of Ripiphorus in the larva, pupa and perfect state, a number of cocoons spun by the larvæ of Anomalon Vesparum, intermixed with which were those of a much smaller species of Ichneumon, which made its appearance in the perfect state a few days afterwards. Of what genus this may be I have yet to learn. I am not aware that an Ichneumon of this size has been described as an inhabitant of wasps' nests; it may, therefore, possibly prove to be new.

"Upon the crown of almost every nest I examined, after the season had become somewhat advanced, I found eggs of Volucella; and my attention was in several instances drawn to a nest by seeing a specimen of Volucella pellucens or of V. bombylans hang about or alight near the entrance to it.

"The breeding of wasps in a semi-domesticated state in-doors was this year attended with only partial success. I had at one time as many as eleven colonies of various species at work in different windows of the house I have used as an establishment for wasps for some years past, *viz.*, five of Vespa sylvestris, two of V. rufa, two of V. vulgaris, and two of V. germanica. These all went on satisfactorily enough for some time, until at length, as the season advanced, the workers belonging to nests round about the neighbourhood, which I had not been able to discover on account of having but little time to search for them, began to increase, until their numbers became enormous. These, attracted by the sugar with which mine were fed, came crowding in swarms into the different boxes, thus at first impeding and ultimately putting a complete stop to the work, not, however, until many of my nests had become fine specimens, and two very extraordinary ones had been produced.

"The facts connected with the production of these two specimens are as follow:— I had a colony of V. germanica at work in a box in *the left hand corner* of the window of a room on the ground-floor, the nest having been removed from its original situation under ground on the 10th of June. On the 18th I took off the shell or covering, which I put by for a specimen, having first neatly joined in the piece I had cut out in order to take out the combs, which were then returned to their place for further work, a plan I generally adopt when I wish to obtain specimens of nests of various sizes from one set of combs. At that period there was nothing remarkable about the nest. About the same time I obtained one of V. vulgaris, which was placed in a box in *the left hand corner* of a window immediately above. It was not long before I observed that a strange variety of colouring was beginning to pervade the newly-formed covering of the nest of V. germanica, and on looking more closely I could perceive that it was partly composed of scrapings from sound wood, and partly from decayed, or touch-wood; and on carefully scrutinizing the individuals composing the colony, it was found to consist in part of V. germanica and in part of V. vulgaris. It appeared, therefore, that a number of workers from the nest in the room above had attached themselves to this one. There was another nest of V. germanica in full work in the opposite, or *right hand corner* of this same window, and as no specimens of V. vulgaris were ever found in it, I conclude that those which had joined the other community made no mistake as to *the corner* of the window in which their own nest was situated, but they miscalculated the height of the proper window from the ground, and so 'got into the wrong box,' but as they came provided with food or building material they were not interfered with, but were allowed quietly to join in the work of the nest and to make it their future home. Widely different would have been their reception had they entered it for purposes of theft, or even if their intentions had appeared to be

suspicious; for although wasps will often allow strangers of their own species to enter their nests without offering them any molestation, though they may have come for the sake of plunder, they will not tolerate the presence of those of a different species under such circumstances; indeed I never before knew them admit of strangers of a different species under any circumstances.

"On the 20th of July I again applied the scissors to this nest in order to remove the covering, which as before, after joining in the piece I had cut out, I put by for a specimen. I then took away the lower comb and reduced the others in size, returning them to the box, and placing them in such a position that the insects should of necessity produce a vase or goblet-shaped nest, which they did, and a splendid thing it is, being, like the one previously formed, composed in part of paper manufactured from sound wood by workers of V. germanica, and in part by paper manufactured from touchwood by workers of V. vulgaris. From the comb and pieces of comb taken away when the covering was last removed numbers of young wasps of both species (V. germanica and V. vulgaris) were produced, thus proving beyond all question that the workers of Vespa vulgaris had not only been assisting in the work of the nest of V. germanica, but had also been depositing fertile eggs in the cells.

"I am enabled to add another instance of the kind. Two nests were situated almost close together in a drain at Cokethorpe Park, which I took out on the 27th of August. One belonged to Vespa vulgaris, the other to V. germanica, and it would appear that, at an early period in the season, workers from the nest of the former species had attached themselves to the latter, their numbers increasing as the season advanced, till at the above date the colony consisted of nearly an equal number of each, as was evident from an inspection of the work, which appeared to be nearly equally divided between the two; streaks composed of paper manufactured from touchwood, alternating with stripes of that substance made from sound wood, as in the case of the two nests previously described.

"If, as I apprehend must have been the case in the present instance, the workers belonging to the colony of V. vulgaris mistook their neighbour's house for their own, the entrances being so near together, it is rather extraordinary that those belonging to V. germanica should not have made a similar mistake. They appeared, however, not to have done so, or, if they did, the mistake, whenever it occurred, must in every instance have been at once discovered and rectified, for no work of theirs was found in the nest of V. vulgaris.

"I do not know how the case may have been in other places, but here I have not met with a healthy colony of wasps since the beginning of September. An unaccountable fatality began to attend them about that time, and in some few instances at a much earlier period, so that nest after nest perished, till not a single nest was to be found, and that long before the usual time for the breaking up of the different communities. It was the same in 1854, the last year the cholera prevailed to a great extent throughout the country. Then I took out numbers of deserted nests, both of V. vulgaris and V. germanica, during the months of August and September, although the weather at the time was of the most glorious character, while underneath the fruit trees in the gardens at Cokethorpe Park, thousands of wasps were to be seen lying dead. So, during the autumn of the present year, I noticed that in a row of young newly-planted elms, many of the trees had, from some cause or other, numerous punctures in the bark, from which the sap was oozing; around each of these punctures were clusters of wasps imbibing the liquid as it oozed from the wounds; while

around the base of each wounded tree lay heaps of defunct wasps. They appeared to sip on till they became powerless, and then to fall and die."

Mr. F. Smith remarked that he had not previously noticed the diseases amongst wasps to which Mr. Stone alluded, but during the past autumn, at Bournemouth, he had found the insects dying and the colonies breaking up in the manner described by Mr. Stone; in August he had found a nest of Vespa rufa all dripping with moisture, and on examination it proved to be full of the larvæ of a Silpha, which had doubtless been attracted by the dead and rotten larvæ of the wasp. He believed also that Mr. Stone's observation of Acari infesting wasps' nests was new.

ANNUAL MEETING,

January 23, 1865.

F. P. Pascoe, Esq., President, in the chair.

An Abstract of the Treasurer's Accounts for 1864 was read by Mr. Wilkinson, one of the Auditors, showing a balance in favour of the Society of £71 11*s.* 11*d.*

The Annual Report of the Council was read by the Secretary.

The President nominated Messrs. Walker and Wilkinson to act as scrutineers of the ballots.

The following gentlemen were elected to form the Council for 1865 (namely), the Rev. Hamlet Clark, Messrs. Dunning, M'Lachlan, Moore, Pascoe, W. W. Saunders, Edwin Shepherd, A. F. Sheppard, Edward Sheppard, F. Smith, Stainton, S. Stevens and J. J. Weir.

The following gentlemen were elected to the following offices respectively (namely), Mr. Pascoe, President; Mr. S. Stevens, Treasurer; Messrs. Edwin Shepherd and Dunning, Secretaries; and Mr. Janson, Librarian.

The President read an Address, at the conclusion of which a vote of thanks to Mr. Pascoe for his services as President and his conduct in the chair was carried by acclamation, and a request was preferred that the Address then delivered might be published in the 'Journal of Proceedings.' Mr. Pascoe returned thanks, and acceded to the request.

A vote of thanks to the other Officers and Members of the Council for 1864 was duly proposed, seconded and carried; and was acknowledged by Mr. S. Stevens.

A vote of thanks to Mr. Dunning, for the assistance given by him towards the publication of the 'Transactions,' was proposed by Mr. Wilson Saunders, seconded by the Rev. H. Clark, and carried. In replying thereto, Mr. Dunning took occasion to remark that a considerable diminution of the cost of publication might be effected if authors would take the trouble, in the first place, to write their papers more legibly, and, in the second place, to revise the MS. instead of the proof-sheets; the sum charged for "corrections" during the past year was sufficient to have paid for the printing of another Part of the 'Transactions.' He would also suggest that authors should write their papers before they read them; it was becoming far too frequent for Members to profess to read papers of which fragmentary portions only were actually

in existence, and months often elapsed before the Society was able to obtain possession of the complete MS. in a fit state to send to the printer. For the last-mentioned grievance the Secretary had the remedy in his own hands; and he announced that in future no notice whatever, in the Minutes or otherwise, would be taken of any paper of which the MS. was not delivered to the Secretary at the time of the author's reading or professing to read such paper.

Report of the Council for 1864.

In accordance with the Bye-Laws, the Council begs to present to the Society the following Report:—

The valuable donations to the Library have from time to time been announced; costly and useful purchases of books have also been made; many volumes have been bound; duplicates and other works on subjects entirely disconnected with the objects of the Society have been expelled; new shelves have been procured; the whole Library has been re-arranged; and a complete Catalogue thereof has been prepared.

The 21st Bye-Law provides that "the Transactions shall be published quarterly." The Council has construed this to mean that a Part of the 'Transactions' shall appear at least as often as once a quarter; for five Parts have been issued during the year. Those Parts contain 470 pp. of letter-press, illustrated by 22 plates; accompanied, moreover, by 90 pp. of the 'Journal of Proceedings'—an issue unprecedented in extent in the history of the Society. It has also been the aim of the Council to print with as little delay as possible; the published 'Transactions' for 1864 include papers read before the Society down to the month of November inclusive. But further, as in 1863 the entire stock of the Second Series was made up into volumes, in 1864 the entire stock of the First Series has been rendered saleable: and the result is, that, contrary to what has been the case for many years past, all the publications of the Society, from its foundation, may now be obtained by those who wish to possess them.

We turn now to the means by which these ends have been accomplished. An Abstract of the Treasurer's Accounts is before you: the receipts and payments for the year may also be exhibited in the following form:—

Receipts.	£	Payments.	£
Cash Balance, January 1, 1864 ...	41	Liabilities, January 1, 1864 ...	36
Members' Contributions ...	124	Rent, three quarters	34
Sale of 'Transactions' ...	70	Librarian's Salary	18
Tea Subscriptions ...	8	Tea, &c., 13 Meetings ...	14
Interest on Consols	3	Fire Insurance	2
Sale of duplicate books, &c.	29	Postage, Stationery, Attendance, Coals and General Management	21
Special Donations	128	Library, Book-cases, &c. ...	48
Loan	45	First Series of 'Transactions'	73
		Third „ „ ...	182
		Journal of Proceedings ...	13
	£448		£441

These amounts of income and outgoing are strikingly in excess of those usually found in the Balance-sheet of the Society, and some of the items call for a moment's notice. The Council refers with satisfaction to the sum of £70 derived from the sale of the 'Transactions,' and regards it as a justification of the large expenditure on the publications and as a presage of the return to be expected from that investment. The total outlay on the publications is no less than £268; and even this does not denote the entire cost of their production; for the drawings and engraving of many of the plates, and in one case the prints of the plates themselves, have been presented to the Society. Donations thus made in kind are none the less worthy of remembrance, though they do not appear in the Cash Account. But even with this assistance, the Council, having only the ordinary income of the Society at its disposal, and but for the extraordinary item of Special Donations, would not have been able to publish more than one-third of what has actually appeared. Most of those donations were expressly devoted by the donors to the payment of publishing expenses, and the sum of £29, from the sale of books, &c., which is also of an exceptional nature, has likewise been applied to the same purpose. The last item on the credit side, £45 raised by loan, in an anticipation of the sale of part of the Society's Consols, to be effected when a convenient opportunity may arrive, and a more favourable price can be obtained; the entirety of this loan has been expended on the permanent improvement of the Library; and (including liabilities outstanding) the total amount expended on the Library exceeds £50. The result of the measures during the past year is, to leave the Society with liabilities to the amount of £58, and assets to the amount of £130; without estimating the stock of 'Transactions,' the value of which cannot be less than £300.

The number of Members has slightly increased. During the year there have been elected eight Members (one of whom was previously a Subscriber) and one Subscriber; one Member has resigned. The result is to leave the number of Annual Subscribers as before, with an apparent gain of seven Members. From this, however, must be deducted the number of those who allow their contributions to fall into arrear, and then silently secede. In point of fact, the number of contributories has varied little during many years. In round numbers, the Society consists of 140 Members, of whom one-twelfth are foreigners, five being French. Contrast with this the Société Entomologique de France, which has 320 Members, of whom one-third are foreigners, twenty being English. How is it that the French Society has thus outgrown its sister? How is it that the French Society counts eighty or ninety indigenous Members more than ourselves? How is it that the French Society has nine times as many foreign Members as we have? How is it that four times as many Englishmen belong to the French Society as do Frenchmen to the English Society? The answer is probably to be found in the fact that the French Society has habitually given to each Member an equivalent for his subscription in the volume of the 'Annales' which it has annually produced.

Until recently, an Entomologist resident in the provinces, if asked to join this Society, might well have replied, "What is the use of my joining? The distance would prevent me from attending the Meetings, and as to the 'Transactions,' I have only to order them of my bookseller, and I can buy all you publish for less than the subscription." Experience seems to show that public spirit and the general interest in the Science taken by many Entomologists is an insufficient incentive to them to support this Society. In short, before the Society can expect any great increase in

the number of its Members, it must be prepared to give a guinea's worth for the guinea it receives.

Here, then, is the explanation of that policy of liberal expenditure which has been followed for the last two or three years. The object has been to increase the comfort of the Meeting-room and the usefulness of the Library—thus providing more especially for the metropolitan Members—and to publish such an amount of valuable Entomological matter as shall be a fair return for his subscription to every provincial or foreign Member. The price to the public of the 'Transactions' sent to every provincial contributor during the last three years is £3 18*s*., during the last year £1 14*s*.; and these can be obtained by Town Members at half price.

It was to attain this result—to place the Society in such a position that it should be really worth while for Entomologists to join our body—that the Council has not scrupled to avail itself of private aid. But now that by such assistance the point has been gained, the Society ought to maintain the position for itself. To do this, our income must be increased by an increase in the number of our Members. What cannot be done for a hundred at a guinea a head may well be done for two hundred at the same rate.

The number of our foreign Members is quite insignificant, whilst many well-known British Entomologists are strangers to the Society. It is to our already Members that we must trust to gain others; it is for you to enable the Society to continue and extend its career of active usefulness, and prevent it from sinking into a state of passive helplessness.

The scientific meetings of the Society have, as heretofore, attracted a goodly attendance. And finally, the Council desires to record the pleasure with which it recently beheld so many of our body unite to pay a tribute of respect to their esteemed colleague, Mr. Wilson Saunders, in recognition of his many services rendered to this Society and to Entomology.

January 23, 1865.

THE PRESIDENT'S ADDRESS.

GENTLEMEN,

On referring to the Addresses of my predecessors, I find that they are generally divided into two parts, one relating to the finances, position and management of the Society, the other to the progress of Entomology as a Science. The Report you have heard from the Council renders it unnecessary for me to enter into the first part; I shall only say that I cannot congratulate you on any increase in our reserved funds; on the contrary, you will see that there has been a considerable diminution. It is right, however, to state that a large

portion of the assets arising from the sale of our collections was expressly intended to meet the wants in our Library, and that these wants have been, in a great measure, supplied. Our Library is now, in fact, a very valuable one, while the Catalogue made by the indefatigable exertions of our Secretary increases its value and completes its usefulness.

Our Meetings continue to be well attended, and the exhibitions of whatever relates to Entomology are on the increase; at the same time our 'Transactions' have probably never been so important, and certainly never so extensive. These, as you are aware, are supplied free to our country Members and at half-price to those resident in town. This privilege, I regret to say, is not so extensively used as might be expected; indeed, when we consider the sale of our 'Transactions' among the public, and the desire evinced by many continental Societies, not exclusively Entomological, to obtain them in exchange, it seems strange that the sale should be so limited among our own Members.

We have not to deplore the loss of any of our Members during the past year, but you will all have heard with deep regret of the death of Dr. Baikie. He was well known to us as a most assiduous Entomologist; and it is understood that he has amassed extensive collections of insects, some of which are now at Haslar. After nine years of exploration in the interior of Africa, he died a few weeks ago at Sierra Leone, just as he was returning to this country.

It would not be possible, within the limits of an Address, to give more than the titles of the books and articles on Entomological subjects that have appeared during the past year. Therefore, omitting the usual lists of papers which may be found in the Natural-History journals and elsewhere, I shall confine myself to making a few observations on various subjects, which, I think, may better occupy our attention for the quarter of an hour or so, during the intervals when the ordinary business of the Meeting will permit. I do so with less reluctance, because, in due time, Gerstaecker's Reports, each filling annually a closely-printed volume of nearly 300 pages, will put you in possession of everything that is printed or published all over the world relating to the entire sub-kingdom of the Annulosa.

I would first call your attention to a paper on the sub-family Corynodinæ, entitled "Corynodinorum Recensio," by the Rev. T. A. Marshall, in the 'Proceedings of the Linnean Society' (Zool. vol. viii. p. 25). In the exhaustive account of the bibliography of the group and the careful and conscientious treatment of the rich materials at

his command, the work is a model for all similar occasions. I am sorry, however, that he has found it necessary to fall back on those shadowy creations "sub-genera." * The same author has also commenced, in the 'Entomologist's Monthly Magazine' (December, 1864), a series of papers on the British Homoptera, which promises to be very valuable: anything outside the limits of those engrossing orders, the Lepidoptera and Coleoptera, cannot fail to be welcome.

I purposely refrain from saying anything of works in every one's hands, such as the 'Entomologist,' the 'Entomologist's Annual,' the 'Annals and Magazine of Natural History,' &c., but in mentioning the 'Entomologist's Monthly Magazine,' I am reminded of the excellent descriptions of the Staphylinidæ, by Mr. Rye, and I think I shall find you all responding to the wish that he would undertake to give us, what we have been so many years asking for in vain, a descriptive catalogue of British Coleoptera. There is no one who can do it better.

And here I would suggest to our collectors the necessity of following up, in this country, the examination of the under surface of large stones deeply imbedded in the earth. My excellent friend, M. Raymond, of Frejus, first led the way, I believe, to this kind of exploration, in conjunction with other French naturalists, and particularly of M. F. de Saulcy, and the result has been the discovery of considerable and always increasing number of new forms, such as Anillus, Microtyphlus, Geodytes, Troglorhynchus and others; so that there is every reason to believe that this hypogæal fauna will exceed, if it does not already do so, that of the grottoes. Hitherto no hypogæal species has been detected in this country, but there is surely no reason why some of them may not be found.

An article by Mr. Roland Trimen, in the 'Quarterly Journal of Science' (October, 1864), is a well-written summary of the Geographical Distribution of the Genera and Species of Butterflies of Madagascar. It appears that there are seventy-three species comprised in thirty-four genera; of the former twenty-eight appear to be endemic, but not one of the latter. This result, as Mr. Trimen has pointed out, scarcely tends to confirm the deductions Dr. Sclater has made from a consideration of the number of endemic mammalian genera in that island. It furnishes, however, another instance that the zoological regions which may hold good for one class will not do for another; among insects, we may say, not even for one order, for

* See some remarks on sub-genera in the 'Westminster Review,' January, 1865, p. 300.

while, for example, we find the Lepidoptera and Hymenoptera of New Guinea and other Papuan Islands belonging, like the birds, to the Australian Region, the Coleoptera of the two have scarcely a genus in common that is not also almost cosmopolitan.

The first part of Mr. Andrew Murray's long-expected Monograph of the Nitidulidæ* appeared last autumn, in the 'Transactions of the Linnean Society' (vol. xxiv. pp. 211—414). We all know Mr. Murray to be a most indefatigable and pains-taking naturalist, and this work more than bears out his reputation: the Introduction is admirable, and we would especially call attention to his notice of the "Habits and Geographical Distribution" of the family, as an excellent example of Science popularly treated. This part only treats of the two subfamilies Brachypterinæ and Carpophilinæ, and it is accompanied by five coloured quarto plates, representing about fifty species, with an immense number of details: these are by Mr. Robinson, and, so far as I am able to form an opinion, they are exceedingly characteristic.

The Trustees of the British Museum have issued Mr. Wollaston's 'Catalogue of the Coleopterous Insects of the Canaries,' a goodly volume of more than 600 pages. The number of species ascertained to belong to that group of islands amounts to 930.† Previously only 179 were known. The same scrupulous care and minute accuracy characterize this as well as his previous works. So far as Entomology is concerned, Mr. Wollaston may claim to have made the Atlantic Islands his own.

The second and concluding part of Mr. Blackwall's 'History of the Spiders of Great Britain and Ireland,' recently published by the Ray Society, has well supported the prestige acquired by its predecessor. There are 304 species described, and most of these are figured on twenty-nine magnificent quarto plates, accompanied by numerous details. The services of Mr. Tuffen West, who, with all his well-known ability, executed the plates in the first part, being, unfortunately, no longer available, the series in the second have been supplied by Mr. Hollick with a skill which is scarcely or not at all inferior. Mr. Blackwall has devoted a long life to the study of the

* Mr. Murray calls the family "Nitidulariæ," and, in opposition to the almost universal custom, he designates the subordinate "tribes" by names, with one exception, ending in "idæ." The "Nitidulidæ," therefore, for Mr. Murray, are not co-ordinate with the Nitidulidæ as *you* understand them, but only with one of its five subfamilies.

† This number has already been very considerably augmented by Mr. Crotch and his brother, upwards of 100 species, having, I believe, to be added to the list.

Araneidea, and this is a most worthy work crowning the edifice of his labours. It seems ungracious, therefore, to say anything that should for a moment lessen our appreciation of it; but it certainly would have been a great advantage to the students of this volume if Mr. Blackwall had said something of the diagnoses of the different genera, and particularly had given some collective idea of them, as they occurred, under each family. At present we have to turn over about 380 pages if we would know what genera have a place in our Fauna. As only one order is treated, it is also desirable that some notice should have been taken of the other orders forming the great class Arachnida. There is a difference of opinion on this subject, and we should all have been much interested if one so competent as Mr. Blackwall had put us in possession of his views respecting the correlation of the spiders to the other groups of its class.

In the last and in a previous part of the Linnean 'Transactions' are some beautiful plates representing highly magnified views of the under surface of the tarsi of insects. These are illustrative of a paper, by Mr. Tuffen West, "On the Foot of the Fly" (vol. xxiii. p. 393). Mr. West considers the pressure of the atmosphere the main agent by which a fly is enabled to adhere to smooth surfaces, and that access of air is prevented by the minute quantity of moisture which exudes from the expanded tips of the "tenent" hairs. This alone, however, Mr. West does not seem to think sufficient; he would supplement it by what he calls the "grasping" power of the foot, "by molecular attraction, and doubtless by other agents still more subtle, with which we have at present scarcely any acquaintance."

Mr. Blackwall,* who commenced his observations thirty years ago, thinks that this hypothesis is "absolutely irreconcilable" with the result of his own observations and experiments. He says that they traverse the upright sides of the dome of the exhausted receiver of an air-pump as long as their physical energy remains unimpaired, and occasionally remain fixed to the glass after having lost the power of locomotion, a circumstance which he considers can only be explained by admitting the adhesive property of the fluid emitted from the extremity of the papillæ on their pulvilli. Mr. Blackwall says the "Spiders that are provided with tarsal brushes run with celerity on the vertical surfaces of highly polished bodies, as those instruments consist of numerous appendages slightly curved downwards and somewhat enlarged towards their extremity, which is densely covered on its

* Proc. Lin. Soc. Zool. vii. p. 159. A recent paper, not yet published, has been read at the Linnean Society, in which these statements are re-affirmed.

inferior surface with minute hair-like papillæ for the emission of a viscid fluid, but which, from their organization, cannot possibly contribute to the formation of a vacuum." Neither of these hypotheses, nor the third, or simply mechanical one, is new, but the subject is far from being settled, and it appears to me to be unlikely that any one theory will apply in all cases, as there is an infinite variety in every part of the structure of the feet in insects, each doubtless best adapted to its own special purpose, or in some way modifying their power.

In the 'Annales des Sciences Naturelles' (1864, p. 64), M. E. Baudelot has given us an account of his experiments on the influence of the nervous system on the respiration of insects, which is "completely opposed to the ideas generally admitted." He considers that the respiratory function does not depend on any special organ (*foyer*), but, on the contrary, that each abdominal ganglion is an organ of locomotive nervous power (*innervation*). In the same work (p. 259) M. E. Claparède has entered into long details on the sanguiferous system and circulation of the Lycosa. One of the most remarkable statements in this article is that the heart, an elongated vessel in the median line of the back, is surrounded on all sides (*baigné de toutes parts*) by venous blood, which is contained in a kind of sac, provisionally named "lacune pericardiaque," but whether this lacuna is the cavity of the pericardium he is unable to affirm. In another place, however, he says there is nothing to indicate the existence of a pericardium. Elsewhere he positively denies the accuracy of some of M. Emile Blanchard's figures in his elaborate work the 'Organisation du Règne Animal.'

With regard to Dimorphism, an important fact has been recorded by Mr. Walsh ('Proceedings of the Entomological Society of Philadelphia,' March, 1864, p. 443). He finds that part of the galls of Quercus tinctoria produce males and females of Cynips spongifica in June; those that remain until October and November, and also in the following spring, produce Cynips aciculata, but females only. Mr. Walsh appears to prove that the latter, although widely different in many respects, is only a dimorphous form of Cynips spongifica.* I have already expressed an opinion that in some cases dimorphism may perhaps be dependent on second broods ('Proceedings' of this Society, April 7, 1862, p. 72), and if attention was paid to this subject probably other instances might be found.

* See also 'Annals and Magazine of Natural History,' vol. xiv. p. 400 (1864).

I copy the following from the 'Quarterly Journal of Science' (vol. i. p. 515): "Professor Wagner found, in June, 1861, under the bark of a dead elm, some whitish apodal worms, which proved to be the larvæ of insects. Each larva was filled with smaller larvæ, at first supposed to be parasitic; but the smaller larvæ were found, upon closer examination, to be identical, even to the smallest details, with the enveloping larvæ, by which identity Professor Wagner was led to assume that the included larvæ represented a second generation produced by the enveloping larva. This would be a case of alternation of generation, even more surprising than that of the Aphides."

The Strepsiptera, or rather the Stylopidæ, after being settled comfortably, apparently, among the Coleoptera, have again had the question of their location raised by Dr. Gerstaecker.* He places them with the Neuroptera, principally for the following reasons:—1, the rudimentary buccal organs; 2, the elongated free anterior and middle coxæ; 3, the radiate venation of the posterior wings; 4, the short and annular prothorax; and 5, the branchiform respiratory organs in the larvæ. But the existence of the last is more than doubtful. Dr. Schaum answers these reasons in a paper in Wiegman's 'Archives,'† just as before he answered Von Siebold's objections. The reasons advanced for considering them as Coleoptera are—1, the coriaceous veinless anterior wings; 2, the striking resemblance between their early (hexapod) larvæ and those of Meloë; and 3, the perfect metamorphosis. It may be remarked that these hexapod larvæ (in the second stage they are apodal) have a singular resemblance to the Thysanura, which are by some also considered to be Neuropterous, and it is worthy of notice that the larva of Xenos Rossii‡ (I am not aware if it is the case with others) is saltatorial, just as the Thysanura are saltatorial.

One of the signs of the times is the number of new works, mostly periodicals, some of them newspapers, devoted entirely or in part to Natural History, and in which Entomology figures to a very considerable extent. These, as might be expected, are intended for the many, and they, no doubt, encourage as well as create a taste for Science. But it is to be regretted that the writers are too often incapable of recognizing what is obsolete or exploded, or have only the knowledge which a rapid glance over an old volume might afford. Thus one of these authorities informs us that "the genus Papilio of

* In the 'Handbuch der Zoologie.'

† A translation will be found in the 'Annals and Magazine of Natural History' for January, 1865, p. 53.

‡ S. S. Saunders, Trans. Ent. Soc. N. S. ii. p. 125.

Linnæus" is divided into six "classes," and he then enumerates them from the Equites to the Plebeii. For that man Entomology has slept for a century. Another authority tells us that "the Scarabæi and Carabidæ of Linnæus" are the most important and extensive of the families of the Coleoptera, and that these two leading families may be divided into eight subfamilies or groups. These are—1, Pilularii; 2, Melolonthidæ; 3, Lucani; 4, Xylophaga; 5, Rhynchophora; 6, Ptinidæ; 7, Elateridæ; 8, Coccinellidæ. The Brachelytræ (*sic*) are represented as "a small group,* not, we believe, generally known as belonging to the Coleoptera." These subfamilies or groups, we are told, include most of the common beetles of this country. It is doubtful if they include one half. But, even in works of the highest class, we now and then find a writer a little *de trop*, as, for instance, when, in a recent Review, we have the lantern flies identified with the Phasmidæ. But one of the strangest bits of fatuity recently found a place in the letter of a well-known writer in America, the correspondent of a London newspaper. After a long account of some peculiar and rather mysterious annoyances to which he had been subjected, he says, "These most disgusting libels on the caterpillar-tribe are but in a chrysalis state. They turn out to be, in the long run, not reptiles, but insects." The caterpillar tribe in a chrysalis state! and then, not to be reptiles after all!! The insect referred to is probably the Spilosoma Virginicum.

The letters of a "*Times* Bee-master" might be appropriately referred to here, but they appear, from the remarks of the Apiarians, at whose hands they have received universal condemnation, to be rather a work of the imagination than a statement of facts.

It would, I think, be very desirable if we could have a cheap series of Introductions to the different Orders of Insects. The classical work of Professor Westwood† is not only out of print, but is, perhaps, on too bulky and expensive a scale to meet the popular want. Divided into moderate and convenient portions, brought down to the present hour, and the bibliography omitted as adding too much to the size, it would form excellent bases for half-a-dozen Manuals, which might embrace the whole class of insects. If there are any figures, they should be the very best, and on steel in preference to wood.

Another class of books we want very much is that of "Index-Catalogues," that is, lists of the published species of families, sub-

* This "small group" only contains about 730 British species.

† 'An Introduction to the Modern Classification of Insects,' 2 vols. 8vo. 1839.

orders, or orders, with references to the places where they are described, or where anything valuable concerning them may be found. The vast number of forms we deal with renders it quite impossible for any one to study effectively more than one or two large groups,* and any information he may want beyond, he can only procure by going over numerous works, and after all may miss what he seeks, because it lies perhaps in some foreign journal, where its existence is only known to the "specialist." I am happy to say that our colleagues, the Rev. Hamlet Clark and Messrs. Bates and Baly, have such a Catalogue of the Phytophaga in the press, and I hope it will be followed by others, but as such works will only meet the wants of a limited class, there will be the risk of a loss on their publication, to which many will not be disposed to submit. It seems to me that such Societies as the Linnean or Zoological would confer a great benefit on the working naturalist, and carry out one of the purposes for which they were instituted, if they were to facilitate our studies by the publication from time to time of Index-Catalogues. Of course we should not expect *them* to confine the work to insects. Every group of the animal kingdom might be taken as opportunity occurred. The earlier British Museum Catalogues were of this kind, and Dr. Gray deserves the gratitude of all zoologists for having originated them. Unfortunately these simple lists† soon grew into descriptive monographs, and, becoming expensive, lost much of their utility. The Trustees, from some cause, have latterly nearly dropped the publication even of these.

Mr. Frederick Smith has kindly informed me that the number of specimens of insects added to the Collection of the British Museum in the year 1864 has been 2813. Of these 1100 were presented, chiefly by Earl Russell, the late Capt. Speke, Dr. Livingstone, J. K. Lord, Esq., and Frederick Bond, Esq.

I have only time to say a few words, in conclusion, relative to our collectors abroad. Mr. Bouchard, who has gone out to the southern shores of the Gulf of Mexico, has, we hear, arrived at Santa Martha, and he is much pleased with the appearance (entomologically) of the country. Mr. Bartlett, the naturalist who accompanied Mr. Tristram in his recent expedition to the East, has sailed for Parà, whence he proposes to ascend the Amazon, making his head-quarters about

* There are about 8000 *genera* in the Coleoptera alone.

† Some of these were published at sixpence, eightpence and one shilling each. They are now, I believe, out of print.

200 miles above the highest point attained by Mr. Bates. Mr. Read is, I understand, about to proceed to Bahia, following up the new line of railroad through the virgin forests of that rich district. And, lastly, it is in contemplation to send out a collector to the new settlement in Northern Australia, a region hitherto quite unexplored.*

* I have to-day received a letter from M. Gaston Allard, Moulevrie, near Angers (Maine et Loire), in which he informs me that he intends in the autumn to proceed to Senegal for the purpose of collecting insects and plants. He has already travelled in Algeria, and is very anxious to meet with a companion for the journey.

Liabilities and Assets of the Society.

Liabilities.

	£	*s.*	*d.*
Rent to Christmas	11	5	0
Williams & Norgate, Books	2	9	6
Loan from Mr. Dunning ...	45	0	0
	£58	14	6

Assets.

	£	*s.*	*d.*
Arrears of Subscriptions :— good,—(say)	23	2	0
Ditto, doubtful, £44 4*s.* 0*d.*			
Cash balance in hand	7	4	5
Consols, £109 14*s.* 9*d.* (say)	100	0	0
	£130	6	5
Less amount of Liabilities	58	14	6
Balance	£71	11	11

Abstract of the Treasurer's Accounts for 1864.

RECEIPTS.

	£	s.	d.
By Balance in hand January 1st, 1864	41	0	3
Arrears of Subscriptions	11	11	0
Subscriptions for 1864 (97)	101	17	0
Admission Fees	10	10	0
Tea Subscriptions	7	12	6
Sale of Transactions at Rooms £52 3 4			
„ at Longmans' 17 15 10			
	69	19	2
One Year's Dividend on £109 14*s.* 9*d.* Consols	3	5	10
Sale of Duplicate Books	16	19	0
„ Waste Paper, &c.	10	2	6
„ Old Copper-plates	1	6	6
Donation from J. W. Dunning, for completing 1st Series of 'Transactions'	73	5	9
„ „ „ towards Publishing Expenses	50	0	0
„ from F. Grut, Esq., for purchase of Books	5	0	0
Cash of M. Jekel, in respect of imperfect book	0	17	6
Loan, from Mr. Dunning	45	0	0
	£448	7	0

PAYMENTS.

	£	s.	d.
To paid arrears for 1863:—Rent to Christmas £11 5 0			
Robinson, Engraving ... 4 14 6			
Newman, 'Proceedings,' &c. 3 9 6			
Roworths, 'Transactions' ... 16 4 6			
	35	13	6
Insurance to Lady-day, 1865	1	13	0
Librarian for attendance	18	4	0
„ for sundry small payments	2	17	6
Tea, &c., thirteen Meetings	13	13	0
Attendance, Coals, &c.	2	5	11
Postage, Parcels, Stationery, &c.	7	19	10
Christmas-boxes	0	12	6
'Transactions,' completing 1st Series	73	5	9
„ 3rd Series, printing, 5 Parts ... £29 11 0			
34 6 4			
18 0 1			
25 17 9			
25 7 6			
	133	2	8
Plates, Engraving	3	10	0
„ Printing	9	19	0
„ Colouring	38	15	0
Printing 'Proceedings,' Circulars, &c.	17	18	0
Books	21	16	8
Bookbinding	6	16	3
Book-case, Chairs, &c.	18	16	0
Collector's Commission	0	9	0
Rent, 3 quarters, to Michaelmas	33	15	0
Balance in Treasurer's hands	7	4	5
	£448	7	0

JOURNAL OF PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON.

1865.

February 6, 1865.

F. P. Pascoe, Esq., President, in the Chair.

Mr. Pascoe returned thanks for his re-election to the Presidency, and nominated as his Vice-Presidents, Messrs. Stainton, W. W. Saunders and Frederick Smith.

The President announced that, through the liberality of Mr. W. Wilson Saunders, the Council was able to offer two Prizes, of the value of Five Guineas each, to be awarded to the authors of Essays of sufficient merit on subjects connected with Economic Entomology. Further particulars would be given at the next Meeting.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Mémoires de l'Académie Royale des Sciences, des Lettres et des Beaux-arts de Belgique,' Tomes xxxii.—xxxiv.; 'Bulletins de l'Académie Royale des Sciences, des Lettres et des Beaux-arts de Belgique,' 2me Série, Tomes vii.—xvii. 1859—64; presented by the Academy. 'Bulletin de la Société Impériale des Naturalistes de Moscou,' 1863 Nos. iii. and iv., 1864 No. i.; by the Society. 'Mémoires pour servir a l'Histoire Naturelle du Mexique des Antilles et des Etats-Unis. Par Henri de Saussure. IIIme Livraison. Orthoptères—Blattides;' by the Author. 'Proceedings of the Royal Society,' Vol. xiii. Nos. 66—70; by the Society. 'Journal of the Proceedings of the Linnean Society (Zoology),' Vol. viii. No. 30; by the Society. 'The Zoologist' and 'The Entomologist' for February; by the Editor. 'The Entomologists' Monthly Magazine' for February; by the Editors.

Exhibitions, &c.

Mr. Brewer exhibited Corticaria truncatella of Mannerheim, a beetle new to Britain, of which he had captured a considerable number of specimens, and Ceuthorhynchus biguttatus, a rare British weevil; both species were taken at Worthing, at the roots of sea-side plants.

Mr. Bond (on behalf of Mr. Rich, who was present as a visitor) exhibited further specimens of the Hepialus from the Shetlands, of which some were shewn at the previous January Meeting; also examples of Bombus Smithianus of White, a species hitherto found only in those islands.

The President made some remarks on the geographical range of the genus Cossyphus. It has occurred in Portugal, Spain, Sicily, the Morea, Algeria, the Canaries (not in Madeira), India, as far as Rangoon, but not in the Indian isles. Singularly enough, however, a species closely allied to that from Rangoon had been taken at Gawler, South Australia.

Prof. Westwood was able to add another locality to this list, for he had received a fine large species from Zambesi.

Major Cox sent for exhibition a portion of a wooden dog-kennel infested with the dog-tick, Ixodes plumbeus; the specimens were very numerous, and during the exhibition copulation was freely indulged in. A specimen of a Cimex, apparently new, was also discovered on the wood. The Major communicated also the following note:—

"My attention has been lately called to the attack of a parasite, which has seriously infested the skin of dogs of my kennel: I believe it to be the Ixodes Ricinus. The skin of all my dogs, as well puppies as grown up ones, has been perfectly spotted by the immense number of these creatures. My ferrets have likewise been attacked. On applying the proper remedies, my man requested me to examine the kennels: I have three large separate ones, and also a range of buildings, twenty-four feet long, divided into three compartments, built up of wood against an old brick wall, the flooring covered with cement: the first contains dogs, the second and third pheasants for breeding. In the two latter the surface of the wall between the bricks, wherever the pheasants could reach, is picked away in order to get at these insects. In all the courses of the bricks, in all the joints of the wood-work, and in the detached kennel which stood nearest to the building, I found the tick in every stage of growth in immense profusion. I at once referred to Kirby and Spence, to endeavour to obtain some information relative to the destructive habits of this peculiar class of insects; but beyond mentioning that they directly attacked sheep, dogs, &c., by inserting their serrated houstellum into the skin and filling themselves with the blood of the animal, they say nothing of the injury they commit upon wooden buildings by working into the joints. Now it is to this point that I wish to call the attention of the Society.

"It will be seen, by the accompanying specimen of wood taken from the dog-kennel, how it has been destroyed. It is a question with me how creatures with a mouth so peculiarly formed could have carried on the work of destruction as they have done, for I found the whole of the roof of the kennel so injured and so thickly infested by them, that I had it at once broken up and burnt on the spot. Do they perforate the dry wood? and whence do they derive nourishment, for I believe they are suctorial parasites? or does the wood perish by the presence of their excremental matter, and so enable them to perforate deeper and deeper. The piece that I have sent up is a good specimen to show how much injury they may do; in it will be found the insect in all its stages, from the egg to its full-grown size; and, speaking of it in the latter condition, I was not aware until now that it presented its large sacculated form, except after feeding as a parasite upon the blood of some animal. I always considered

it in its natural state to be a minute insect, the body of which became highly distended as it continued to derive nourishment from the creature upon which it was preying. I never made this class of insects my study, and therefore should be too glad to receive any information from my brother entomologists on this subject. On examining the piece of wood, I find there are several insects very much resembling the large gray tick; but as some of these insects possess six legs, I do not know to what species they belong, or in what condition they are. The egg is oblong, semitransparent, and of a dirty brown colour, laid in masses.

"Whilst writing this I have been informed of a gentleman who had a pack of harriers attacked in a similar way. A person in London was consulted in the matter: he came down, and on inspecting the wooden building found it very much infested with the tick; the greatest portion of it was, therefore, pulled down and rebuilt; but in a very short space of time the new work was found to be infested as badly as the old; in fact, the portion that had been permitted to remain contained a sufficient brood to contaminate the recent structure. The dogs were nearly worried to death by these parasites, and it ended by the whole building being pulled down and burnt. I may mention that dogs and other animals infested by these insects can be easily rid of them by simply putting on a muzzle and washing them with a solution of arsenic (a weak solution) in soft soap, allowing it to remain on for a short time, and then thoroughly washing it out of the hair. Two applications will be all that are necessary.

"I have no doubt that in buildings slightly affected the insects may be eradicated by a similar process, but when once they have been allowed to propagate and enter the timber joists, nothing but the total destruction of every part contaminated will secure safety. Thus the whole of my range must come down and the wall be composted before I can erect a new kennel. From my own costly experience, and the instance above alluded to, I may fairly place the Ixodes Ricinus amongst that class of insects which are indirectly injurious to man in the destruction of his property. I think this a question of more than passing interest, considering how seriously large flocks of sheep or kennels of dogs become affected, without our attention being properly directed to the cause whence the mischief arises. In some districts the tick is much more prevalent than in others; and, from what I have recently experienced, I have no doubt that the insects have been allowed to accumulate amongst the decayed wood of some of our half-perished homesteads, and as the flocks are constantly herded in them, and the sheep naturally rub against the sides, it is easy to conceive, when such a state of things exists as I have just witnessed, how soon a whole flock might become infested.

"I omitted to mention that, in places suspected of being infested, the joists should be examined during the hot sunshine, as these insects invariably come out to the edge of the cracks to bask in the warmth, when they are easily detected."

Mr. W. W. Saunders had seen Major Cox's kennel last summer, before the existence of the tick was known, and thought that the decay of the wood was attributable to dampness, and not to the Ixodes, which view was corroborated by the specimen of the wood which had been forwarded.

Prof. Westwood agreed that the destruction of the wood was not caused by the Ixodes, but probably by damp, with the assistance perhaps of some Oniscidæ. The exhibition was interesting, since it showed indubitably that the small brown creature,

which had hitherto been regarded as the juvenile form of the tick, was, in fact, the adult male.

Mr. Rich mentioned that he had found ticks to be most easily destroyed by rubbing common grease into the skin of the dog or horse; a couple of applications would generally be found sufficient.

* *Paper read.*

Mr. J. S. Baly read "Descriptions of New Genera and Species of Phytophaga."

March 6, 1865.

F. P. Pascoe, Esq., President, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Proceedings of the Royal Society,' No. 71; presented by the Society. 'Linnæa Entomologica,' vol. 15, 'Entomologische Zeitung,' 1865, Nos. 1—3; by the Entomological Society of Stettin. 'The Naturalist,' Nos. 10—20; by the West Riding Consolidated Naturalists' Society. 'The Zoologist' for March; by the Editor. 'The Entomologists' Monthly Magazine' for March; by the Editors.

Election of Members.

Herbert Jenner, jun., Esq., of Hill Court, Berkeley, Gloucestershire, and the Rev. T. A. Marshall, M.A., of Hart Street, Bloomsbury, were elected Members. Richard Lydekker, Esq., of Harpenden Lodge, St. Albans, was elected an Annual Subscriber.

Prize Essays.

The President announced that, as an inducement to the study of Economic Entomology, the Council had determined to offer Two Prizes, of the value of Five Guineas each, to be awarded to the Authors of Essays or Memoirs, of sufficient merit, and drawn up from personal observation, on the anatomy, economy, or habits of any insect or group of insects which is in any way especially serviceable or obnoxious to mankind. The Essays should be illustrated by figures of the insects in their different states, and (if the species be noxious) must show the results of actual experiments made for the prevention of their attacks or the destruction of the insects themselves.

On former occasions the Council selected a definite subject, as *e.g.*, the Coccus of the Pine Apple, the larva of Agrotis Segetum (the large caterpillar of the turnip), &c. The consequence was, that competition was diminished or not called into play. On the present occasion, therefore, the selection is left to the candidates themselves, provided only that the subject be one fairly belonging to the Economic branch of Entomology.

The Essays must be sent to the Secretary at No. 12, Bedford Row, with fictitious signatures or mottoes, on or before the 31st December, 1865, when they will be referred to a Committee to decide upon their merits; each must be accompanied by

a sealed letter indorsed with the fictitious signature or motto adopted by its author, and inclosing the name and address of the writer.

The Prize Essays shall be the property of, and will be published by, the Society.

Exhibitions, &c.

Mr. Bond exhibited specimens of a gall found on a willow tree near Cambridge; the tree was fifty feet high, and almost every twig appeared to possess its gall, which took the form of a premature terminal development of leaves in whorls, so as to resemble a flower-head. He had observed the galls only the day before the Meeting; the leafy excrescences were then dry and withered, and he was unable to state what was their colour when fresh.

Mr. W. W. Saunders remarked upon the similarity between this and the Swiss gall which he had exhibited at the Meeting of November, 1861 (*ante*, p. 48), in which, however, the leaf-like processes were not spread out, but were adpressed to the stem.

Mr. Bond also exhibited varieties of Colias Edusa and Vanessa Urticæ, both captured in Norfolk or Suffolk; each was remarkable from having the wings, particularly the hind wings, conspicuously blotched or suffused with dark patches.

Mr. T. W. Wood (who was present as a visitor) exhibited a variety of the male of Apatura Iris, captured in Kent: it was remarkable for the absence of the usual white markings on both the upper and under sides of the wings. He also exhibited a moth from Bahia, belonging to the family Arctiidæ, and supposed to be new to Science.

Prof. Westwood, referring to the exhibition at the previous Meeting of Major Cox's Acari, said that he had at the time called attention to the position during copulation of the small male, which anchored itself by means of its mouth upon the breast of the female; he had since found that De Geer had observed the same fact, and had figured it, but had misrepresented the position; the male appeared to continue *in situ* for a considerable time, in fact for several days. Major Cox's dogs must have been very recently worried by the ticks, as many of the specimens taken home by the Professor for examination were found to be full of blood. He had taken numerous eggs off a portion of the kennel, and one female was discovered full of eggs; there were also on the wood the shells of eggs which had hatched, the first skins of the larvæ, and various stages of the insect; in the first and second stages they were dull yellow and had only six legs; in the third stage they appeared to begin to suck, and though not larger than a well-sized pin's head, were distended with blood; in the fourth stage they had eight legs, the sexual distinctions became visible and sexual intercourse was carried on. The Cimex found on the wood had proved on examination to be a well-known insect.

The President mentioned that he had also taken home a pair of the Ixodes *in copulâ*, and had gummed the female down, in which position she had remained for a fortnight, at the end of which she was found in the act of walking away. He remarked upon the great vitality of female insects after impregnation and before the deposition of eggs.

The President read the following:—

A Note on Generic Names having nearly the same Sound.

"It frequently happens that I am called upon to defend the principle that no generic name ought to be changed simply because it has a near resemblance to

another generic name of prior date. I have thought, therefore, that a short notice, calling attention to the enormous evil involved in such changes, both as to the number of names that would have to be cancelled, and to the uncertainty as to what should be considered to be too near an approach to the older name, would be desirable. In such closely sounding words as *Cercus* and *Circus*, *Ectinus* and *Ectimus*, *Sypalus* and *Sipalus*, there could be no doubt; whether, having regard to our peculiar pronunciation, such names as *Lina* by the side of *Læna*, *Centor* by *Sintor*, or *Dignomus* by *Dinomus* would be admissible, would not be a question out of England. Few, too, would have any difficulty about *Pteroclus* and *Pterocles*, *Drapetes* and *Drapetis*, *Hephialtus* and *Ephialtes*, *Spondylis* and *Spondylus*, but some may hesitate as to *Lema* because of *Lemur*, *Harpalus* because of *Hapalus* or *Colotes* because of *Calotes?* Then would no one be found to assert that *Europs* was too close to *Euops*, or *Blax* to *Blaps*, or *Astycus* to *Astacus?* *Hyperion* has been found too near *Hyphæreon*.* Should we not also reject *Tychius* because of *Trichius*, *Frixus* because of *Phrictus*, *Typhæa* because of *Tiphia?* M. James Thomson ignores *Desmocerus* because of *Desmoderus*, *Orthostoma* because of *Orthosoma*, *Aphics* because of *Aphis*. But compare *Thysia* to *Thyrsia*, *Frea* to *Phæa*, *Nicias* to *Nysius*, *Ælara* to *Hilara*, and by the same standard we should reject them too. Then there are many names that, owing to a radically different spelling, may not have struck us as being similar in sound, such, for instance, as *Allæsia* and *Halyzia* (as well as *Alysia*), *Sitona* and *Cetonia*, *Lichas* and *Lycus*, *Enema* and *Anæma*, *Cyrtus* and *Syrtis*, &c. One great authority considers all names as practically identical which only vary in the termination. Thus *Ammobius* is sunk because of *Ammobia*, while to replace it we have *Ammophtorus*, notwithstanding that there is already an *Ammophorus*, and in the same family too. Following up this rule, what is to become of *Dromius* after *Dromia*, *Pachyta* after *Pachytos*, *Mycetæa* after *Mycetes*, *Pogonus* after *Pogonias*, and so on? What are the advantages to be derived from such changes? Ornithologists have no difficulty in using *Pica* and *Picus*, *Otis* and *Otus*, &c. It is bad enough to have to alter the names that are *absolutely* identical, and they are more numerous, I think, than is generally imagined. It will be seen that I have entirely confined myself to the Coleoptera, as being better known, in the names I have quoted that will require to be cancelled, if the principle I contend against should be adopted. A word or two as to making slight alterations to render, I presume, names more classical. This, I think, ought not to be done except when some very gross error has been committed, as in the celebrated *Spavius* case. Dr. Kraatz has just used the word *Melarachnica* avowedly because the more correct form would be too long. On the other hand, Mr. Crotch, in his 'Catalogue,' changes *Emus* of Leach to *Emys*, but Leach, probably, very well knew that this form of the word had been already appropriated to a genus of tortoises. Mr. Crotch, therefore, must either coin a new word or go back to the old one. Is there anything but confusion likely to follow such alterations?"

Prof. Westwood thought it unadvisable to change generic names on the ground discussed by Mr. Pascoe, or indeed on any ground except the precise identity of the two appellations. He had, thirty years ago, compiled a catalogue of all the generic

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* Prof. Westwood changed the first of these names to *Campylocnemis*, under the idea that it had been previously used; Mr. Macleay's genus, however, was *Hyphæreon*.

names then published, and in so doing he had made numerous alterations in the forms given by the authors thereof, either because the names were too near to others of prior date, or because they were not classically formed, or for other reasons which then appeared to him sufficient. That Catalogue was still in MS., but if it ever should be published, his experience had led him to the conclusion that the proposed alterations ought to be rejected, and that for the avoidance of confusion, the original names, even if not quite classical, ought to be retained. Even where two generic names were precisely identical, not only in sound, but in spelling, he thought some modification of the rule, as now generally understood, was admissible; he did not think it necessary that the name of a genus of insects should be sunk and another substituted in its place merely because it was subsequently discovered that the same name had been previously applied to a genus of plants, birds or fishes; it was sufficient if the same generic name did not occur in duplicate in the same class of the animal kingdom.

Mr. W. W. Saunders thought that botanists had now abandoned the practice of altering the names of genera of plants on the ground that such names had been previously used for zoological genera.

Prof. Westwood directed attention to a translation, in the March number of the 'Annals and Magazine of Natural History,' of a paper by Schiödte on the Classification of Insects, and in which the author compared the merits of Fabricius and Latreille as philosophic classifiers, his conclusion being strongly in favour of the former. The Professor combatted this view, and vindicated the scientific and philosophic eminence of Latreille.

The President, whilst admitting the ability of the author, also criticized the paper in many of its details, as *e.g.*, where the author sets aside all the primary characters whereby the Prionidæ are at once distinguished, for the purpose of establishing a character in the stipes of the maxillary palpi, which is said to be moveable, but the adoption of which character served only to group insects together which were, in fact, widely separated, and thus to produce an unnatural arrangement; and again, where the author argues in favour of the lamellæ of the antennal club of the Lamellicorns being a modification of hairs. Moreover, Schiödte's observations appeared to be made for the most part on the very limited fauna of Denmark.

Paper read.

Mr. M'Lachlan read "Trichoptera Britannica; a Monograph of the British Species of Caddis-flies."

In this paper, the result of five years' study of the group, the author gives detailed descriptions of 124 species, arranged in 43 genera, and full accounts of the habits of the same, so far as they are known to the present time. Stephens, in his 'Illustrations' (1836-37) described no less than 183 so-called British species; but some species were there given under as many as six different names, and the two sexes of the same insect were not unfrequently placed in different genera or sections. The number was reduced to 108 by Dr. Hagen in his Synopsis of the British species published in the 'Entomologists' Annual,' 1859—61, the true number known at that time being probably under one hundred. The difference between that number and the 124 species now enumerated represents the additions to our Trichopterous fauna during the last four or five years.

April 3, 1865.

F. P. Pascoe, Esq., President, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'The Journal of the Royal Agricultural Society of England,' 2nd series, Vol. i.; presented by the Society. 'The Transactions of the Linnean Society of London,' Vol. xxiv. Part 3; by the Society. 'The Journal of Entomology,' No. 12; by the Proprietors. Hewitson's 'Exotic Butterflies,' Part 54; by W. W. Saunders, Esq. Doleschall, C. L., 'Bijdrage tot de Kennis der Dipterologische Fauna van Nederlandsch Indië,' Parts 1—3; 'Bijdrage tot de Kennis der Arachniden van den Indischen Archipel;' 'Tweede Bijdrage tot de Kennis der Arachniden van den Indischen Archipel;' by A. R. Wallace, Esq. 'The Entomologist's Monthly Magazine' for April; by the Editors. 'The Zoologist' for April; by the Editor.

Election of Members.

Captain Willoughby S. Rooke, of the Scots Fusilier Guards, and of Bigswear, Gloucestershire; R. S. Scholfield, Esq., of the Junior Carlton Club; and Dr. Sichel, of Paris, were severally balloted for, and elected Members. Mr. Stephen Barton, of Bristol, was balloted for, and elected an Annual Subscriber.

Exhibitions, &c.

The President exhibited a new species of Bolboceras from South Australia, which was found burrowing in the hard road at Gawler, near Adelaide, a habit similar to that of the European B. gallicus. The Australian species was described by its captor, Mr. Odewahn, as "making a noise like a Longicorn, by moving the small pulvilli beneath the hind coxæ."

The President read the following extract from the 'Athenæum' of the 18th of March, 1865:—

"Bottesford Manor, Brigg, March 13, 1865.

"In Saturday's 'Athenæum' (p. 352), it is recorded, that at the Meeting of the Entomological Society, held on March 6, 'Mr. Bond exhibited specimens of a gall found on a willow tree near Cambridge; the attack of the insect . . . caused a premature terminal development of leaves in whorls, so as to resemble a flower-head.' Galls of this kind are of very frequent occurrence on willows in this neighbourhood, and, I believe, throughout the whole of Lincolnshire. They are so common here that I have always supposed that they must be familiarly known to naturalists. They first show themselves in the latter summer and early autumn, but are not easily discovered until the tree sheds its leaves. When that happens the gall-leaves become prominent objects. Their form is singularly like that of a small rose, and the likeness is increased by the colour, which, in December and January, is a light brown, very often nearly approaching red. As time goes on the brown becomes deeper, and when the green leaves shoot forth in spring the galls drop off. The likeness to a rose is often so complete that an uninstructed person might easily be led to the absurd conclusion that he had seen roses growing on willows. That this opinion was current at one time is proved by the following entry in the chronicle of John Capgrave, 1338: 'In that same

yere welowes bore roses, red and freeh; and that was in Januarie,' p. 207. This is another proof to be added to those accumulating daily, that the strange histories to be found in the records of past ages are not, for the most part, deliberate fables, but truths ill understood, or facts seen out of their proper perspective. There is a story told by an Irish writer, of a certain willow tree, which, having received the blessing of S. Coënginus, straightway began to bear apples. (*Zan. Beyerlinck, Theat. Vitæ Humanæ*, t. 1, p. 921a). It is highly probable that the foundation of this legend must be sought in a similar direction.

"Yours, &c.,

"Edward Peacock."

Mr. W. W. Saunders exhibited a number of galls collected during the previous year in Southern Syria by Mr. B. T. Lowne. One was on a species of Acacia, from Engedi; another was of scaly or flaky material placed round the stems of Atriplex Italinus, from the Dead Sea; a third, probably the gall of a Dipterous insect, was on a grass; a fourth kind occurred on Reaumuria, from Ain Terebeh, Dead Sea; a fifth on Ærua Javanica, from Engedi; a sixth on a Salvia, from the same locality; and a seventh kind was found on a species of Tamarix, at Ain Terebeh. With respect to the first two, Mr. Saunders was unable to say with certainty whether they were the nidi of insects; the gall on the tamarisk bore great resemblance to that described and figured in the 'Transactions' some years ago (see Trans. Ent. Soc. v. 27, pl. ii. figs. 5—9), and was probably caused by one of the Buprestidæ. Mr. Saunders hoped to breed some of the perfect insects, and on a future occasion to supply further information, or at all events to lay before the Society accurate drawings of the galls.

Mr. F. Moore exhibited a small collection of Lepidoptera lately received, *by post*, from Captain A. M. Lang, from the North-Western Himalaya. It included various Polyommati; a fine new Chrysophanus from Kunawur; a small Anthocharis, allied to A. Cardamines, also from Kunawur; two undescribed species of Pieris—one allied to P. Mesentina—from the Runang Pass (14,800 feet elevation); a specimen of Pieris Daplidice, which was found in considerable numbers in the village fields along the Spiti River; Gonepteryx Wallichii from the north of Simla; Parnassius Jacquemontii and P. Hardwickii—the former from the high passes (18,000 feet) in Upper Kunawur, Spiti and Tibet, the latter from the Runang Pass (14,800 feet). Of Nymphalidæ there were Argynnis Kamala and A. Jainadeva from the Simla district and Kunawur; a new Limenitis, allied to L. Sybilla, from North of Simla; a beautiful little Melitæa from the Kongma Pass leading from Kunawur into Chinese Tibet. Of Satyridæ, five new species of Lasiommatus, Hipparchia and Erebia, from the mountain slopes of Spiti, Upper Kunawur, and Tibet. Lastly, a single specimen of the curious form figured by Bremer, in 'Lepidopteren Öst Sibiriens,' as Callidula Felderi.

Mr. F. Moore also exhibited two Entomogenous Fungi found at Darjeeling by Mr. A. E. Russell—similar to that figured in plate 277 of vol. iii. of Cramer's Pap. Exot., upon a species of Sphinx (Pachylia achemenides) from Surinam. One of these parasitic Fungi was upon a male imago of the common Indian Lepidopterous insect, Spiramia retorta (Noctuidæ, Fam. Hypopyridæ), and the other upon the imago of a species of an undetermined Geometrideous genus. Both these moths had the fungus springing, in more or less lengthened hair-like filaments, from the body, legs, palpi, antennæ, and along the nervures (but not from the membranous portion) of the wings on the upper side. Mr. Moore was informed by Mr. M. C. Cooke that these peculiar Fungi belong to the doubtful genus Isaria, the majority of the species of which are

parasitic on insects or exuviæ: this genus is *not* regarded as autonomous, but as a condition of the ascigerous genus Cordiceps (Entomogenous Sphæriæ).

Mr. Janson exhibited a large collection of insects, principally Lepidoptera and Coleoptera, formed by Mr. A. E. Russell in Bengal and the Himalayas.

The President read the following extract from 'The Times' of the 28th of March, 1865:—

"*French Honey.*—A great portion of the immense quantity of honey consumed in France is supplied from the island of Corsica and from Brittany. Corsica produced so much wax in ancient times that the Romans imposed on it an annual tribute of 100,000 lbs. weight. Subsequently the inhabitants revolted, and they were punished by the tribute being raised to 200,000 lbs. weight annually, which they were able to supply. Wax is to honey in Corsica as one to 15, so that the inhabitants must have gathered 3,000,000 kilogrammes* of honey. When Corsica became a dependency of the Papal Court it paid its taxes in wax, and the quantity was sufficient to supply the consumption not only of the churches in the city of Rome, but those in the Papal States. Brittany likewise supplies a great quantity of honey, but of inferior quality to that of Corsica. The annual value of the honey and wax produced in that province is estimated at 5,000,000f."

The President read the following note:—

"Last July, when passing over the snow-fields on the top of Monte Moro, at an elevation of about 8000 feet, I noticed here and there a sharply-defined cylindrical hole in the snow, such as might have been caused by pressing a wine-cork into it. These holes were generally about an inch in depth, and at the bottom of each was either a small lump that looked like peat, or more frequently an insect, invariably either Dipterous or Ichneumonideous. I cannot account for the lumps of peat; but I imagine that the insects, settling on the snow, became torpid from its low temperature, and sank gradually (or perhaps rapidly) into it, the hole being caused by the melting of the snow by the radiation of heat from the insect. The solar rays on mountain summits are asserted to be warmer than those falling on the plains, but there is no doubt that the radiation from solid bodies at great elevations is very marked. I took Cryptus tarsoleucus apparently not long alighted, and still feebly moving a wing or a leg. Perhaps it is only in the finest weather that insects would take so lofty a flight; however, a little lower down, Bombus montanus was not uncommon, enjoying itself amongst the flowers of a Linaria, but surrounded on all sides by patches of snow. Nearly up to the same point I frequently passed a little black moth, Psodos trepidaria, taking its short trembling flight. Higher than either of these, and among some short grass in the middle of the snow, I found a Byrrhus. These were the last evidences of animal life observed. But as flowering plants extend to upwards of 10,000 or even 11,000 feet, it would be interesting to learn if insect-life in any form co-exists with them. A mammal, Arvicola nivalis, is found, I believe, at the highest point of phanerogamic vegetation."

In reply to enquiries, the President added that the insects in the snow were all dark in colour, that the holes were on the slope of the mountain on which the sun was shining directly, and that they were truly cylindrical, not hemispherical, or narrowed

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* *Qu.* kilogrammes or pounds?

at the bottom. His explanation of the phenomenon did not meet with general acceptance; it was objected that radiation was scarcely likely to produce a cylindrical excavation; and Mr. A. R. Wallace doubted whether an insect of so small bulk and mass, and which could only give off by radiation the heat which it had first absorbed, was capable, even though of dark colour, of absorbing sufficient to produce the considerable melting of the snow around it which the President had described.

Prof. Westwood directed attention to Karsten's recently-published 'Beitrag zur Kenntniss des Rhynchoprion penetrans,' and protested against the generic appellation there applied to the Chigoe or Jigger. Linnæus was uncertain to what genus to refer the insect, and Latreille suggested that a new genus was probably required for its reception; the Rev. Lansdown Guilding had in MS. assigned to it the name Sarcophaga, which, however, had been previously employed amongst the Diptera. In a paper in the 'Transactions' of this Society (vol. ii. p. 199), Prof. Westwood had himself first given the generic characters and published the name Sarcopsylla; Dugès had about the same written on the Jigger, but referred it to the genus Pulex, and Guérin-Méneville, in the interval between the reading (May 1, 1837) and the publication (1840) of his (Prof. W.'s) paper, had on the plates of the 'Iconographie du Règne Animal' employed the name Dermatophilus, but his description was not published till long afterwards. The name Sarcopsylla was entitled to stand, according to the rule of priority, and Prof. Karsten was not justified in rejecting it, and falling back upon Rhynchoprion, which had been formerly used for a genus of Acari. Prof. Westwood also took credit to himself for having first shown that the Jigger was oviparous, not larviparous or pupiparous; Prof. Karsten had now shown how the sexes might be distinguished before the female became gravid: the 'Beitrag' also contained elaborate details of the structure and anatomy of the Jigger, but it did not contain one word on the generic arrangement, nor did it add one single fact to the natural history of the species. He (Prof. W.) was anxious to know what became of the eggs after they were deposited, (say) in the toe of a human being? where did they hatch? and where and upon what did the larvæ feed? There could not be room for all the numerous eggs to develope in such a situation as above supposed; and moreover, in the vast majority of instances the eggs could not be deposited in flesh at all.

Mr. Bates had had personal experience of the attacks of the Jigger, but was unable to answer the Professor's enquiries; the common belief was that the body of the female burst within the toe, that the eggs hatched therein, and that the larvæ fed upon the flesh; but he had never had anything but eggs (no larvæ or pupæ) extracted from his own person; if during the process of extraction the body of the female burst, he had always applied tobacco-juice to prevent any ill effect.

Paper read.

Mr. Bates read a paper "On the Species of Agra of the Amazons Region."

In the introduction, the author treats of the affinities and describes the habits of this arboreal genus of Carabidæ peculiar to Tropical America, and then proceeds to characterize sixteen new Amazonian species, whereby the total number of described species is advanced to 140. Forty-seven species of Agra and Agridia are recorded as occurring in the Amazons region; of these forty-two were found by Mr. Bates, and thirty-one of them were new to Science.

The employment by Mr. Bates of the two forms Carabici and Carabidæ to denote the same group of insects evoked from the President a strong protest against the in-

discriminate application of two names to the same thing; he insisted also upon the desirability—to prevent confusion, amounting to necessity—of having one uniform termination for the names of groups of co-ordinate value and importance; and further, that the proper termination for the name of a family was *-idæ*, the form almost invariably adopted by English entomologists, and which was now being adopted also by the French. Prof. Westwood expressed himself in favour of the nomenclature introduced by Kirby, and the employment of *-idæ* as the termination of the name of a family or of a group of insects corresponding to one of the old Linnean genera.

New Part of the 'Transactions.'

A new Part of the 'Transactions' (Third Series, Vol. ii. Part 4) was on the table.

May 1, 1865.

H. T. Stainton, Esq., V.-P., in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Proceedings of the Natural History Society of Dublin,' Vol. iv. Part 2; presented by the Society. 'Bulletin de la Société Linnéenne de Normandie,' Vol. ix.; by the Society. 'Mémoires de la Société de Physique et d'Histoire Naturelle de Genève,' Tome xvii., 2e Partie; by the Society. 'The Entomologist's Monthly Magazine' for May; by the Editors. 'The Zoologist' for May; by the Editor.

Election of Members.

F. D. Godman, Esq., of Park Hatch, Godalming; J. T. D. Llewellyn, Esq., of Ynisygerwn, Neath; and W. H. Groser, Esq., of 19, Claremont Square, London; were severally balloted for, and elected Members.

C. B. Clarke, Esq., Fellow of Queen's College, Cambridge; Edward Clift, Esq., of Lewisham; and Mr. W. Farren, of 10, Crescent, Cambridge; were severally balloted for, and elected Annual Subscribers.

Death of William Sharp MacLeay.

The Secretary read from a Sydney paper of the 30th of January, 1865, an obituary notice of William Sharp MacLeay, whose death, at the age of seventy-two, occurred on the 26th of that month. Mr. MacLeay was elected a Member of this Society in 1836 and a Member of the Council for 1837, but resigned prior to his departure for Australia in 1839.

Exhibitions, &c.

Prof. Westwood mentioned that with reference to the jigger, the subject of some discussion at the previous Meeting, Mr. F. Smith had called his attention to a passage in Waterton's 'Wanderings in South America,' pp. 173, 174, as tending to show that the larvæ fed on the flesh in which they were deposited. He considered, however, that further observation on this point was necessary.

Mr. S. Stevens produced a Cassida, which he had hoped to have exhibited alive; it had been found some days previously in London, near a newly-opened case of Orchids, but had unfortunately died a few hours before the Meeting. Mr. Baly

recognized the beetle as belonging to the genus Prioptera, probably a new Himalayan species.

Mr. Stainton exhibited a nest of smooth (hairless) Lepidopterous larvæ found near Marlborough, hanging from a beech-tree by means of silken strings, which were at first mistaken for threads.

Mr. Dunning read the following extract from the 'Journal of the Society of Arts' for the 14th of April, 1865:—

"*A new American Silkworm.*—It appears, from 'Silliman's Journal,' that after numerous experiments, Mr. L. Trouvelot, of Medford, Mass., has succeeded in rearing successfully, and in great numbers, Attacus Polyphemus, *Linn.*, and in preparing from its cocoon an excellent quality of silk, possessing great lustre and strength, and pronounced superior to Japanese and all other silks, except the best Chinese, by competent judges. The silk is unwound by a simple process perfected by Mr. Trouvelot, each cocoon yielding about 1500 yards. This insect is very hardy, being found throughout the Northern States and Canada; and, as it feeds upon the leaves of oak, maple, willow, and other common forest trees, may be reared easily in any part of the country. Mr. Trouvelot has gradually increased his stock from year to year, by raising young from the eggs of the few individuals first captured, until he has at present seven waggon-loads of cocoons, the entire progeny of which he proposes to raise during the coming season. The first public notice of his experiments with this insect was given by Mr. Trouvelot at a meeting of the Institute of Technology, at Boston, about a year ago, when he exhibited specimens of silk manufactured from it, both natural-coloured and dyed."

Mr. F. Smith read the following letter from Dr. T. C. Jerdon, dated "Lahore, March 16, 1865:"—

"I have at last got hold again, after a long absence, of the specimens of workers of Dorylus, and they are, as you suggested, evidently, I think, Typhlopone. It is, however, strange to say, quite a Termes in its *habits*, working under ground *entirely*, and never coming outside except when the males are coming forth winged, when they accompany them in swarms to the holes by which they make their exit. I first observed the workers at Mhow, in Central India, where they had undermined a house so completely that the foundation had to be dug up, and I there saw the winged males (Dorylus) issuing out of the same holes as the workers. I afterwards saw them twice again; the last time in a green-house of the Botanical Garden at Saharunpore, N.W. Prov. They were issuing every morning and evening in great numbers from a hole in the flooring (lime), and several winged individuals were with them, and these entered houses at night: this was in February. I have met with Dorylus in every station where I have been, and it is certainly curious that the workers are so little known, as they must have been observed occasionally by hundreds of Europeans. I have a lot in spirit, and enclose you three or four in this letter, enough, I dare say, to show if it is the same species mentioned in your 'Catalogue,' T. Curtisii, or not. Dr. Jameson laughed me to scorn when I talked of digging up the flooring of his pet green-house, but if I ever get an opportunity of another nest in a get-at-able situation, I will try and get at the mystery of the female. Surely, however, some of the winged individuals must be females; if not, then the only other conclusion is that the female always remains apterous, and is impregnated in the nest; or, if winged, that she is kept a forcible prisoner till her wings drop off. I would have written long ago, but was separated from the bottle containing the workers."

Mr. F. Smith thought there was now little doubt that Typhlopone was the worker of Dorylus, as had been suggested years ago by Shuckard. The female, however, was still unknown.

Prof. Westwood enquired whether Mr. Smith was acquainted with the insect which Gerstäcker represented to be the female of Dorylus; it was very different from Typhlopone. Mr. Smith replied that he had never seen the large female in question, but he believed its connexion with Dorylus to be purely conjectural.

The Rev. Hamlet Clark exhibited an interesting collection of Phytophaga received by him from Mr. Du Boulay, who captured them in the district of Champion Bay, West Australia. Among the many novelties was a very abnormal form of Eumolpidæ, unique in structure not only among Eumolpidæ but throughout the Coleoptera: the male leaps vigorously and quickly when captured, and it is the only species of Eumolpidæ that is known to be saltatorial; but the peculiarity of the insect is, that it is not the posterior but the *medial* femora which give this power of leaping: the posterior femora are of ordinary form, or perhaps somewhat attenuate; the medial, however, are very robust, incrassated, sufficiently elongate and with strong and curved tibiæ. Mr. Clark remarked that it might be a question whether the insect properly belonged to the Eumolpidæ or to some other group: he stated that it had been carefully examined not only by himself but by Mr. Baly, and that there seemed to be no doubt on the subject. He proposed to create a new genus for the reception of this insect, and to describe it under the name of Thaumastomerus viridis.

The Rev. H. Clark read from 'The Reader' of the 1st of April, 1865, the following extract from a review of Cameron's recent work on 'Our Possessions in Malayan India:'—

"The following account of that very common tropical phenomenon, the light of the fireflies, is altogether new to us, and not quite intelligible. Does the author mean that the little insects actually keep time with each other so accurately, that thousands of them scattered over a shrub or tree all put out their lights at the same instant, and rekindle them with equal punctuality? If so, here is a new insect-wonder, before which the economy of bees and ants will sink into insignificance:—'The bushes literally swarm with fireflies, which flash out their intermittent light almost contemporaneously; the effect being that for an instant the exact outline of all the bushes stands prominently forward, as if lit up with electric sparks, and next moment all is jetty dark—darker from the momentary illumination that preceded. These flashes succeed one another every three or four seconds for about ten minutes, when an interval of similar duration takes place, as if to allow the insects to regain their electric or phosphoric vigour.' We commend this as a subject of investigation for those naturalists who are so fortunate as to live among fireflies."

Mr. Clark added that, though he was utterly unable to give any explanation of the phenomenon, he could so far corroborate Mr. Cameron as to say that he had himself observed this simultaneous flashing; he had a vivid recollection of a particular glen in the Organ Mountains, where he had on several occasions noticed the contemporaneous exhibition and extinction of their light by numerous individuals, as if they were acting in concert.

Mr. M'Lachlan suggested that this might be caused by currents of wind, which, by inducing a number of the insects simultaneously to change the direction of their flight, might occasion a momentary concealment of their light.

Mr. Bates had never in his experience received the impression of any simultaneous flashing; on the contrary, he thought there was the greatest possible irregularity in giving and extinguishing the light, and that no concert or connexion existed between different individuals; he regarded the contemporaneous flashing as an illusion, produced probably by the swarms of the insects flying amongst foliage, and being continually, but only momentarily, hidden behind the leaves. Mr. Bates further remarked that the light-emitting insects were Lampyridæ, not Elateridæ (Pyrophori), which rarely flew by night; the Lampyridæ had a weak vacillating flight, the number of species was very large, and he had himself found eighty or ninety species; several species would flit about together, and in the squares of Pará he had captured three distinct species; it would be curious if there were any concert or action in unison between individuals of different species.

Mr. Clark remarked that the lights of the Lampyridæ and Elateridæ were perfectly distinguishable; it was the former which gave the intermittent flashing light.

Mr. W. W. Saunders had frequently observed the fireflies in Bengal, at Pondicherry and at Madras; they usually flew at a height of ten to fifteen or twenty feet, amongst the foliage; he had never noticed any flashing or regularity of intermission, and thought that each individual was perfectly irregular and independent in the exhibition or extinction of its light.

M. Sallé (who was present as a visitor) had never observed any flashing or regular intermittency, or simultaneous emission or extinction of the light.

Prof. Westwood was unable to recall any analogous phenomenon; the simultaneity of the flight of Empis over standing water seemed to be the nearest in point.

The Rev. H. Clark mentioned that a lady residing near Buckingham Gate had introduced into her garden a quantity of peat for horticultural purposes, and now found that part of the garden to be very much infested with wood-lice. When asked for a remedy, he had suggested the application of hot water, or the importation of toads; he was curious to know whether there was any affinity between the peat and the wood-lice?—were the latter breeding in the peat, or feeding on it?

Mr. W. W. Saunders was in the habit of using a great deal of peat for horticultural purposes, but he had not noticed that it was particularly acceptable to wood-lice, which moreover would not be likely to occur in the places whence the peat was brought.

Prof. Westwood remarked that wood-lice were fond of decaying wood, and the taste of peat was probably not dissimilar; he did not think the creatures were introduced with the peat, but they might be attracted to it, especially in the absence or scarcity of their natural pabulum. Frogs, toads, or hedgehogs would eat up the wood-lice; but the best way of extirpating them was to pour boiling water upon them, which might be readily done, as they were always found to congregate in the angles of a frame or other construction, or just within the frame, between the sides thereof and the soil or manure within.

Mr. J. J. Weir did not find that frogs, toads, or birds kept down the wood-lice; he had tried numbers of frogs and toads, but they were ineffectual.

Mr. Stainton directed attention to a paper by Mr. B. D. Walsh "On the Insects Coleopterous, Hymenopterous, and Dipterous, inhabiting the galls of certain species of Willows," published in the proceedings of the Entomological Society of Philadelphia for 1864. In this paper the author proposed to name and describe the galls found on willows at Rock Island, Illinois, the insects which produce them, and also other insects

which habitually breed in the galls formed by true gall-makers, and which, as they feed on the substance of the gall itself and only occasionally or incidentally destroy the gall-making insect, may be appropriately considered as "Inquilines" or Guest-flies. Mr. Walsh enumerates five species of willow, Salix discolor, *Muhl.*, which yields three distinct galls; S. cordata, *Muhl.*, which yields six galls; S. longifolia, *Muhl.*, which yields three; S. nigra, *Marshall*, which yields two galls, and S. humilis, *Marshall*, which yields no less than ten distinct galls; some of these galls, however, occur on more than one species of willow. Besides the true galls, a Coleopterous pseudo-gall was found on Salix longifolia. Of twenty-one undoubtedly distinct galls, twelve are made by Diptera (Cecidomyidæ) and six by Hymenoptera (Tenthredinidæ). In addition to a great number of insects which occasionally inhabit these galls, there are, of true inquilines, which seem to inhabit them exclusively, but without confining themselves to one particular species of gall, seven Cecidomyidous species, two Tenthredinidous species, and at least one, and probably four or five Coleoptera, besides seven species of Micro-Lepidoptera. The author points out the danger of mistaking inquilines for the true makers of the gall, and gives numerous instances in which saw-flies are inquilinous in the galls of gall-gnats, and gall-gnats inquilinous in the galls of saw-flies. The same gall is often inhabited by several different species of inquilines, and many species of guests habitually live in the galls of several different species of hosts. Occasionally one and the same species is sometimes inquilinous in the galls of other insects, and sometimes attacks natural substances in no wise connected with galls. "Nothing gives us a better idea of the prodigious exuberance of insect life and of the manner in which one insect is often dependent upon another for its very existence, than to count up the species which haunt, either habitually or occasionally, one of these willow galls, and live either upon the substance of the gall itself or upon the bodies of other insects that live upon the substance of the gall. In the single gall, Salicis brassicoides, *n. sp.*, there dwells the Cecidomyia which is the maker of the gall—four inquilinous Cecidomyiæ—an inquilinous saw-fly—five distinct species of Micro-Lepidoptera, some feeding on the external leaves of the gall, and some burrowing into the heart of the cabbage, but scarcely ever penetrating into the central cell so as to destroy the larva that provides them with food and lodging—two or three Coleoptera—a Psocus (Pseudo-Neuroptera)—a Heteropterous insect found abundantly in several other willow-galls—an Aphis, which is also found on the leaves of the willow, but particularly affects this gall—and, preying on the Aphides, the larva of a Chrysopa (Neuroptera) and the larva of a Syrphide (Diptera)—besides four or five species of Chalcididæ, one Braconide Ichneumon, and one Tachinide, which prey upon the Cecidomyiæ and the Micro-Lepidoptera; making altogether about two dozen distinct species, and representing every one of the eight Orders, if with Sieboldt, Erichson, and Hagen, we refer Pseudo-Neuroptera to Orthoptera."

Referring to the alleged discovery of Wagner that the larvæ of Cecidomyia breed young ones,—that a second generation of larvæ is developed within the bodies of the first,—the author expresses his firm belief that the young larvæ which crept out of the bodies of Cecidomyia larvæ were nothing but larvæ of Chalcididæ or Proctotrupidæ, several species of which he knew from experience to breed inside the bodies of larvæ of willow Cecidomyiæ. As to Wagner's statement that the same newly-born larvæ went through the same process a second time, he believes it to be a pure and simple delusion.

Mr. F. Smith was in possession of numerous rose-galls, from which had

hatched several specimens of Nematus; these, however, were not the makers of the gall, but were either "inquilines" or they might have been in or on some other part of the wood; the real inhabitants of the galls were now in the pupa state.

Papers read.

Mr. Bates read a paper "On New Species of Agra from the collection of Mr. W. W. Saunders," and described four new species: A valentina, from Venezuela; A. dominula and A. Saundersii, from Peru; and A. occipitalis, from Brazil.

Mr. F. Smith read "Descriptions of some Species of Hymenopterous Insects belonging to the Families Thynnidæ, Masaridæ, and Apidæ." Most of the insects were brought from Western Australia by Mr F. Du Boulay. The new Thynnidæ comprised Thynnus ventralis, Ælurus agilis, Rhagigaster similimus and R. flavifrons. Of Masaridæ there were three new species of Paragia, P. calida, P. venusta, and P. vespiformis. But the most remarkable insect was a leaf-cutting bee with antennæ like a butterfly, for which a new genus was proposed, and it was described as Thaumatosoma Duboulaii.

The Rev. Hamlet Clark read "Descriptions of new Phytophaga from Western Australia." Five species of Paropsis, two of Chalcolampra, a Chalcomela, an Australica, and two species of Geloptera were described; most of them from Champion Bay, and captured by Mr. F. Du Boulay.

June 5, 1865.

F. P. Pascoe, Esq., President, in the chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Proceedings of the Royal Society,' No. 72; presented by the Society. 'Transactions of the Zoological Society,' Vol. v. Part 4; 'Proceedings of the Zoological Society,' 1864, Parts 1—3; by the Society. 'Annales de la Société Entomologique de France,' 4me Serie, Tome iii., Tome iv. Trim. 1—3; by the Society. 'Essai Monographique sur le Bombus montanus et ses Variétés,' par Dr. Sichel; by the Author. 'A Letter to the Trustees of the British Museum on the Condition of the National Collection of Invertebrata: by Philocosmos;' by the Author. 'The Zoologist' for June; by the Editor. 'The Entomologist's Monthly Magazine' for June; by the Editors.

The following addition by purchase was also announced:—'Genera des Coléoptères d'Europe,' Livraisons 124—127.

Election of Members.

Lieut. R. C. Beavan, Messrs. W. Borrer, G. R. Crotch, W. S. Dallas and T. G. Rylands were severally balloted for, and elected Members. Messrs. T. Brunton, B. Cooke and R. J. Ransome were severally balloted for, and elected Annual Subscribers.

Exhibitions, &c.

The Rev. Hamlet Clark exhibited, and distributed amongst the Members, specimens of a beetle from British Kaffraria, which appeared to be an entirely new form of

Parnides. The captor, Mr. J. H. Bowker, of the Mounted Frontier Police, sent the following note respecting them:—"Water beetles, very like Spanish flies, very numerous in the Sunn (?) River: their habits are curious; whirling on a sunny day over the edge of the fall, they then make a sudden dive through the fallen water, and fasten to the face of the rock; they resemble in this way a flock of sea-birds when feeding. I never saw them at any other spot." Mr. Clark stated that the insect approached most nearly to Macronychus, *Müller* (*Illig. Mag*), a genus of Elmidæ, but differed therefrom in the form of the head, the number of joints of the antennæ, &c.; its strong and broad claws and elongated robust legs would serve admirably to secure the beetle to the face of a rock, but it was not very evident how its legs were adapted for swimming.

The Rev. H. Clark read extracts from a letter recently received from Mr. Edwyn Reed from Bahia; want of knowledge of the language had prevented Mr. Reed from going up the country as soon as he had desired; he was proposing to spend May in Valença, and about June to proceed into the interior to the residence of a hospitable timber-merchant on the borders of the primæval forest. His first collection of objects of Natural History might very shortly be expected in London.

Mr. Janson read a letter from Mr. J. A. Brewer, dated Fayal, April 24, 1865, reporting the capture of about 150 species of Coleoptera at St. Michael's, by working as in England in winter; there were no insects moving about, it being still (though very warm) the winter of the Azores; many of those captured were apparently well-known British species, whilst others were unknown to the writer; the majority consisted of Carabidæ and Staphylinidæ, with some Curculionidæ and a few Elateridæ.

Mr. F. Smith exhibited a specimen of Apate capucina, taken by his son Mr. Edgar Smith, in Bishop's Wood, on the 21st of May last, running over fallen timber (oak); he was not aware of the occurrence of the beetle in this country for some years, though Mr. Hope had formerly on one occasion captured half a dozen in Longmynd (or Longmont) Forest, Shropshire.

Prof. Westwood mentioned that Sir Thomas Pasley had formerly sent him a number of specimens from Pembroke Dockyard, where they were found burrowing in the oak timber.

Mr. Bond exhibited the specimen of Dianthœcia albimacula, the capture of which, on the 8th of June, 1864, near Gosport, is recorded in 'The Entomologist's Monthly Magazine,' vol. i. pp. 237, 282.

Mr. Bond also exhibited a Saturnia Polyphemus and its cocoon; and a large Ophion and its cocoon.

Mr. Stainton exhibited some galls on the leaves of an evergreen oak (probably Quercus Ilex), brought by Mr. Burney from Mentone.

The President exhibited a Dorcadion, probably a new species, which he had captured a month previously at Alicante.

Prof. Westwood mentioned that in the Burchell Collection, recently added to the Oxford Museum, were specimens of larvæ preserved in a dry state by a means capable of easy adoption; the larvæ were simply placed under heavy weights, so as to squeeze out all the intestinal matter, and then dried rapidly; the shape was of course lost, the skins being as flat as the paper on which they were exhibited, but the colours were admirably preserved.

Mr. F. Smith exhibited various Bombi, in illustration of some criticisms upon Dr. Sichel's 'Essai Monographique sur le Bombus montanus et ses Variétés,' and

expressed his dissent from the conclusion of the author, that the numerous forms of Bombus therein mentioned were not true species, but merely varieties of the B. montanus of St. Fargeau.

Prof. Westwood directed attention to an article in 'The Gardener's Chronicle' of the 3rd of June, 1865, by Mr. W. Carr, of Clayton Bridge Apiary, Newton Hall, Manchester, in which the writer gives a detailed account of his observations, showing that workers of the Ligurian bee produced perfectly developed males or drones, corroborating Mr. Stone's experience as to the occasional prolificness of worker wasps. The Professor also took occasion to remark upon the abundance of queen wasps during the present year, notwithstanding the disease and destruction of the previous autumn, as mentioned by Mr. Stone (*ante*, p. 66).

The Treasurer produced an extract from the 'Pall Mall Gazette' of the 31st of May, which stated that an exhibition of insects was about to be held in Paris.* The exhibition was to be divided into two categories; the first to include (1) the producers of silk, (2) the producers of honey and wax, (3) the insects used in dyeing, (4) insects used for the table, and (5) insects used in medicine. The second category was to consist of all the insects that prove destructive to cereals, vineyards, orchards, forests, and woods used for building purposes.

The President said that amongst the insects used for the table might be included the larva of a Macrotoma, which, under the name of "Bardé," was (as he was informed by Mr. Du Boulay) considered quite a luxury in the Swan River district of Australia. The larva in question had been erroneously attributed by Mr. Newman to a different insect, which he had named Bardistus cibarius.

The Rev. H. Clark mentioned that, in company with Mr. Grut, he had been present at a meeting convened by Lord Granville for the purpose of considering the destination of some of the Exhibition Buildings at South Kensington, and was glad to find the existence amongst those present of a very general feeling that more Museums were required in London. He advocated the formation of district Museums in different parts of the metropolis.

Prof. Westwood also spoke in favour of the establishment of more Museums, and remarked that there were buildings in the metropolis suitable for, or capable of easy adaptation to, such purposes, *e. g.* the building in the Surrey Gardens, only temporarily occupied.

Mr. Grut said that a Committee had been formed to promote the institution of a Museum of South London.

Mr. Edward Sheppard thought that, speaking with reference to Entomology, one good central collection was all that should be aimed at in the metropolis; that more harm than good would be done by forming a number of petty collections; and that the experience of this and other Societies in attempting to form collections should be borne in mind.

The President advocated the formation of small collections of typical forms for educational purposes.

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* The exhibition is announced to open on the 15th of August, and will be held in the Palais de l'Industrie, under the auspices of the Central Society of Agriculture, the Minister of Agriculture and Public Works being the President of the Committee of Organization.

Papers read.

The Rev. H. Clark read the concluding part of his "Descriptions of new Phytophaga from Western Australia;" including twelve species of Paropsis, four of Edusa, and one each of Thaumastomerus (*n. g.*) and Ocnus (*n. g.*).

Mr. F. Moore read a paper entitled "Descriptions of new Bombyces from North-Eastern India." The species were four in number, *viz.* Bombyx Sherwilli, allied to B. Huttoni; Saturnia Cidosa, closely allied to S. Pyretorum; S. Lindia, allied to S. Grotei; and Loepa Miranda; specimens of all of which were exhibited.

July 3, 1865.

F. P. Pascoe, Esq., President, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Exotic Butterflies,' by W. C. Hewitson, Part 55; presented by W. W. Saunders, Esq. 'Illustrations of Diurnal Lepidoptera,' Part 2, Lycænidæ, by W. C. Hewitson; by the Author. 'The Natural History of the Tineina,' Vol. ix. (Gelechia), by H. T. Stainton; by the Author. 'A Catalogue of the Lepidoptera of Devon and Cornwall,' Part 2, by J. J. Reading; by the Author. 'Resumen de las Actas de la Real Academia de Ciencias de Madrid,' 1862—63; by the Academy. 'Proceedings of the Literary and Philosophical Society of Liverpool,' 1863—64; by the Society. 'The Zoologist' for July; by the Editor. 'The Entomologist's Monthly Magazine' for July; by the Editors.

Election of Members.

Messrs. R. Borthwick, A. D. Carey, W. Cole, H. D'Orville, W. S. M. D'Urban, A. E. Eaton, J. E. Fletcher, A. G. Latham, John Linnell, jun., G. F. Mathew, A. Mercer, Dr. Colquhoun and Sir William V. Guise, Bart., were severally ballotted for, and elected Members.

Messrs. A. H. Hudd, Evan John, E. Meek and Morris Young were severally ballotted for, and elected Annual Subscribers.

Special Vote of Thanks.

On the proposition of Mr. Dunning, seconded by Mr. Stainton, a special vote was unanimously carried, returning thanks to Mr. W. W. Saunders for his hospitable reception of the Society at Reigate on the 23rd ult.

Exhibitions, &c.

Mr. Bond exhibited Eupithecia campanulata (*H.-S.*), a species new to Britain, bred by the Rev. H. Harpur Crewe from larvæ found in a beech wood near Tring, Herts, feeding on the unripe seeds and seed-capsules of the nettle-leaved campanula (*C. Trachelium*, Linn.) in August, 1864. See Zool. 9260; Ent. Mo. Mag. i. 142. The perfect insects emerged in June, 1865. Also Eupithecia pulchellata (*Ste.*), bred at the end of May last from pupæ sent to him by Mr. C. S. Gregson, of Liverpool, who found the larvæ on the foxglove (*Digitalis purpurea*).

Mr. Bond also exhibited three specimens of Toxocampa Craccæ, bred from eggs sent by the Rev. E. Horton to Dr. Knaggs; the larvæ fed for the first day on Lathyrus pratensis, subsequently on Orobus tuberosus, and eventually had choice between the last-mentioned plant and Vicia sepium, and fed freely and indifferently on either.

Mr. Stainton exhibited cocoons of Pyralis glaucinalis, sent to him by Mr. Edwin Brown, of Burton-on-Trent, and which were remarkable for their broad and flat form; also larvæ of Cemiostoma Lotella, mining in the leaves of Lotus major, sent to him by Mr. T. Wilkinson from Scarborough: a peculiarity of this species was that the egg, after hatching, was distinctly visible in the mine as a bright metallic spot.

The Rev. Hamlet Clark exhibited a miscellaneous collection of beetles captured by Lieut. Julian Hobson, at various times and in various localities in Central India, whence the insects had been sent in glass tubes by post; and read the following (addressed to the Editor of the 'Ceylon Examiner'), also received from Lieut. Hobson:—

"Sir,—I shall feel thankful if any of your readers could inform me whether the Lampyris, or glow-worms, met with in Ceylon, exhibit any variety in the number of their phosphorescent lights; and if so by how many lights they differ.

"Mr. Milne Edwards describes one species, a native of the hot regions of America, which emits light from certain spots situated over the two or three last rings of the abdomen. The tangun, also a native of America, is described as emitting light from analogous spots over the prothorax. Sir Emerson Tennent, in the second volume of his work on Ceylon, in a foot-note in p. 257, says he has seen the insect three inches long, 'but without a proportionate increase of splendour.'

"I have caught an insect two inches long, and for the number and beauty of its lights I never saw anything to equal it, nor indeed has any European or native to whom I have shown it. The Lampyris in question is of a dirty pale orange colour, and of the thickness of a goose-quill. It can contract or elongate itself at pleasure; has eleven segments or rings; with the exception of the first and last, is studded with a pair of lamps of more than emerald brightness; constituting in all eighteen lamps, nine on each side, each light being of the diameter of a small-sized goose-quill.

"The insect exhibits slight streaks of black on the dorsum of the first two segments, whilst the common Lampyris has well-marked black lines on the back of all its segments; its habit is sluggish, and it differs from the common variety in this respect. It would bury itself deep in the earth, rendered soft by a free sprinkling of water, and never show itself unless forced out for examination. The common Lampyris would shun the light of day; and at night, unlike its shy neighbour, would stealthily creep out of its hiding-place, and, with tail erect, open the window of its single lamp and shed forth a bright light all round. To examine the new insect, it is necessary to touch him, and then it will curl itself up and impart the resemblance of a ring studded with 'jewelled lamps.' M.

"Gampolle, 15th January, 1865."

With reference to the discussion at the May Meeting (*ante*, p. 94) on the alleged contemporaneous flashing of the light of fireflies, Mr. Clark read the following extract from a letter received from Mr. Alexander Fry:—

"I can confirm your observation that the fireflies of the genus Aspisoma of Castelnau (corrected into Aspidosoma by Lacordaire) flit at night in great numbers

over low-lying damp fields, chiefly near water, emitting light by short flashes at intervals of three or four seconds, the majority keeping time with each other, as if in obedience to the *bâton* of a leader. I think it is only the fireflies of that genus who practise it. The numerous fireflies common in Mexico and North America belong chiefly to the genera Ellychnia and Photuris, whose habits are different, so far as I have had opportunity to observe their congeners in Brazil."

Mr. W. F. Evans said that, in consequence of the late President, Mr. F. Smith, having called attention to Madame Merian's statement respecting the emission of light by the lantern-fly, he had sent a copy of the President's Address (of the 25th of January, 1864) and an outline drawing of Fulgora laternaria to his son, Mr. W. T. Evans, of the Commissariat, at present in British Honduras, with a request that he would endeavour to ascertain the fact: the following was an extract of a letter recently received from him:—

"Belize, 17th May, 1865.

"I have succeeded in my entomological researches about the lantern-fly. I had one given to me (caught here) alive, and I myself saw it giving light. I kept it in a tumbler for about a day, and it sometimes did not give it, but at others it did. The ants have eaten off two of its legs. I must wait for a chance to send it home."

The Rev. Douglas C. Timins communicated the following "Note of a Month's Collecting at Cannes":—

"The month of March being extremely cold for this climate, collecting did not begin this year until April. The gay-coloured Gonepteryx Cleopatra was the first note-worthy capture, and appeared in very great abundance in fields and marshes. I took Papilio Podalirius very commonly on the blossoms of the peach and apricot: when on the wing its flight is rather rapid, and the insect has a curious appearance, darting about head downwards with its long tails up in the air, as it usually does. Our English 'Bath White' (*Pieris Daplidice*) was common everywhere, and easily known from its congeners by its rapid flight: I mention this because I have read that in the North this species flies slowly; so does Vanessa Atalanta in England, but *not* in the South. Indeed rapidity of flight is, so far as I can learn, characteristic of nearly all the diurnals of Southern France, except Limenitis Candida and the different Thais. Thecla Rubi and L. Candida were very common near wild thyme and cistus, and the pretty Anthocharis Belia, with its green and silver markings, also. I took one Papilio Feisthamelii and a great many different Thais. The only 'coppers' to be seen were Chrysophanus Phlæas and (rarely) C. Helle, or an allied species. Vanessa Io, V. Cardui, V. C-album and V. Antiopa were very common; the latter had white borders invariably, though many were *fresh* specimens, and were occasionally found with their wings not dried, having but just emerged from the pupa: this species, I believe, must be double-brooded in this locality. Of the genus Argynnis, Cinxia, Lathonia and Provencialis (?) were common everywhere; A. Dia much less abundant. The lovely little Polyommatus Hylas, though local, was common where found. Polyommatus Alexis was as abundant as it is in England, and P. Corydon very rare and local (*not* occurring on or near chalk). Colias Edusa was in profusion everywhere; C. Helice, however, was uncommon: I took one true C. Myrmidone—a species which is, I believe, quite new to these parts. Our English 'holly blue' (*Polyommatus Argiolus*) was common on the top of cork trees, and there was also an allied species, which I have not yet been able to identify. Our own Anthocharis Cardamines

abounded; but the gay-coloured A. Eupheno (or Southern orange-tip) was exceedingly rare and local. Towards the end of April, Papilio Machaon appeared, and also Hesperia Altheæ and H. Lavateræ. Coleoptera were in profusion everywhere, chiefly Cicindelidæ and Chrysomelidæ; Chrysomela Banksii and C. cerealis were, however, rather rare. Numerous Orthoptera appeared, but none of any rarity. In the beginning of May the lovely Limenitis Camilla appeared on the Ile Ste Marguérite; its flight is, if possible, more graceful (though much more rapid) than that of its northern congener, L. Sybilla. In company with this species flew Zygæna Lavenduli, in woody glades where *no* lavender grew, though it was totally absent from the mainland, where there are miles of wild lavender! The pretty moth, Acontia luctuosa, now appeared; also Ephyra omicronaria and various other Geometræ. During the first week in May I explored the mountains behind Grasse: I would advise every collector who happens to be within reach to do the same, for these mountains contain a perfect treasury of entomological wealth. During a few hours' collecting I took seven species of diurnals quite unknown to me, though I am pretty well acquainted with the French Fauna, besides Anthocharis Eupheno and the cosmopolitan Oreina Adrasta, which I have found in various parts of France, Switzerland and Italy. Sugaring is of no use in this 'waste of sweets,' where the air is literally loaded with perfume from acres of orange trees and miles of full-blown roses, and the hills are covered with wild thyme and lavender. Early in May I took Polyommatus Salmacis, which is certainly not a species one would expect to meet with in the South, but the Fauna of Cannes is, as I have mentioned before, very peculiar, comprising northern as well as southern species—*e. g.* Anthocharis Cardamines and Eupheno, Gonepteryx Rhamni and Cleopatra, &c.: I have no doubt whatever but that G. Cleopatra is a distinct species; Boisduval's statement to the contrary has been questioned, and the differences of the larva and of the female (which, though very like G. Rhamni, is yet clearly distinct) seem to establish the specific claim of G. Cleopatra sufficiently. I trust soon to be able to communicate a monograph of the small but little-known genus Thais, based on personal observations of the species composing it in their various stages. Few as are the species, their synonymy is completely confused. It seems to me that recent authors, and especially Mr. Kirby, in his work on European Butterflies, have rather hastily sunk several to the rank of varieties which a careful personal study would have led them to retain as species. But it is only by observing the *living* insects that we can arrive at the truth in matters of this kind; and if those who have the opportunity would carefully study a single genus each in all the stages of the insects composing it, much of the confusion which exists among the European Lepidoptera might be cleared up. I have myself endeavoured to do this with the genera Thais and Zygæna, and hope soon to submit the results of my labours to the Society."

Mr. W. F. Kirby remarked that, in the work referred to, he had in almost all cases followed Staudinger as an authority.

Dr. Armitage (who was present as a visitor) exhibited the case of a female Oiketicus, into the open end of which were simultaneously thrust the bodies of three males, manifestly with a view to copulation with the single female within. The specimens had been killed and were shown *in situ*; they were from Monte Video, and had been determined by Mr. F. Walker to be Oiketicus Kirbyi.

Prof. Westwood doubted whether the insect was O. Kirbyi, the case of which was, according to his recollection, very different in structure; he believed that it was the

habit of the females of this genus never to quit the case, or rather, never to leave the pupa-skin, but to turn the body round within the pupa-skin so as to bring the sexual part in contact with that of the male; in the present case it would appear that copulation had not actually taken place, but the males were destroyed in that position by reason of their extended penes having been caught in the silken or woolly matter which formed the interior lining of the case, and their escape thus prevented.

Mr. Dunning mentioned that, in the year 1850, when strolling in the vicinity of Storthes Hall, Huddersfield, in company with Mr. Inchbald, they had found two males of Micropteryx calthella simultaneously in sexual contact with a single female: unfortunately neither gentleman had any entomological apparatus with him, and the specimens could not be secured; they were, however, carried for upwards of a mile on the dandelion-flower on which they were reposing, but after this interval the contact was discontinued, and the moths flew away. (See Zool. pp. 2501, 2830, 2858, as to this species frequenting the dandelion and other flowers.)

Mr. Bates read a letter from Mr. B. D. Walsh, of Rock Island, Illinois, dated April 22, 1865, from which the following are extracts:—

"I have read your paper on mimetic Lepidoptera with the greatest interest. I am naturally of a sceptical turn of mind, and apt to require rigid proof of everything; but although I had rather a prepossession against the truth of your theory before I commenced reading, I am now quite convinced that you are perfectly correct. Judging from your figure of Leptalis Nehemia, the resemblance in shape of wings—which I find to be a pretty constant character in Lepidoptera—is, if possible, still more remarkable than the resemblance in coloration between Leptalis and Ithomia.

"We have in this country a somewhat similar mimetic analogy between Danais plenippus and Limenitis disippus, insomuch that a certain Professor in a popular book on insects figures the latter under the name of the former! They do not fly in company, but as the former is strong on the wing, and the latter rather sluggish for a butterfly, may it not be the case that by the resemblance birds have been deceived into the belief that it is no use to pursue it? Plenippus is very common here, Disippus rather rare.

"I have discovered within the last few days that the larva of this Disippus is remarkable for hybernating in the immature larva state in a case made of a willow-leaf, which it first secures by silken cables to the twig. The case is made by cutting away most of the terminal portion of the leaf, and then joining the remaining edges together, so that the whole somewhat resembles the leaves of some pitcher-plants (*Sarraceniæ*). As a rule, with the exception of Hesperidæ, which osculate with Heterocera, the Rhopalocera do not roll up leaves to live in, though Cynthia Cardui makes a rude kind of tent for itself, while the closely-allied Cynthia Huntera, unless my memory deceives me, makes no tent at all. Mr. Lintner, in his paper, Proc. Ent. Soc. Philad. iii. 63, says that he captured Disippus 'early in May, appearing as if it had survived the winter.' It must have been larvæ that had 'fed up' in the spring that produced his imagos. The second brood comes out late in the summer, after remaining only a week or so in pupa, from larvæ which, so far as I have hitherto observed, do not construct any cases to live in, seeing that they have no hybernation to go through in that state. Thus it seems we have a kind of *metagenetic* habit of leaf-rolling, which appears only in alternate generations. I found altogether 12—20 of these larva-cases on Salix humilis, several containing little larvæ, a quarter to half an inch long,

several with the larvæ close to or on the empty cases, and one with a dead larva in it. Like the very young larvæ of Papilio Turnus and Asterias they are brown with a patch of white on the middle of the back, so as to simulate the dung of a small bird; but specimens which I am breeding have already moulted into nearly the coloration of the full-grown larva. I know of no other butterfly here that hybernates in the larva state, though there are plenty of moths that do so. Pieris Cratægi is said by Godart to do so normally, and Melitæa Dia and Euphrosyne seem to do so occasionally according to Vaudoner (Westw. Intr. ii. 355).

"I notice that you give the Nymphalide genus Protogonius as mimetic, though, probably for lack of room, it is omitted from your Table (Trans. Linn. Soc. xxiii. p. 503). What genus does it imitate?

"I have been much struck by the statement which you repeat several times, that Ithomiæ copulate only with specimens coloured almost exactly like themselves. This seems to harmonize well with Mr. Scott's fact that the red variety of the primrose is perfectly barren with the common primrose; and that the blue and red pimpernels are also barren when intercrossed, according to Gartner, as quoted by Darwin. We have in this locality Colias Philodice and C. Eurytheme, which differ only in coloration (the first sulphur-yellow, the second a fine deep orange) and fly promiscuously together, yet keep perfectly distinct from each other, intermediate grades and intercrosses not occurring, except in a single instance, *viz.*, I once found a pair *in copulâ*, one sex a true Philodice, and the other with the upper wing only, if I recollect right, coloured as in Eurytheme, the lower wing as in Philodice."

Mr. Stainton referred to 'The Zoologist,' pp. 7563—65, where the history of the hybernation of the larva of the English species, Limenitis Sibylla, in the leaves of the honeysuckle, is given at length by Mr. Newman, from the observations of Dr. Maclean, of Colchester.

The following is extracted from a letter addressed to Mr. F. Smith by Mr. S. Stone, of Brighthampton, near Witney, dated April 29, 1865:—

"Great as was the number of female wasps which made their appearance last spring, and early as was the period at which they commenced their labours, they have this year appeared in still greater number, and have begun work at a still earlier period. The weather to the end of March was bitterly cold, but a sudden change then took place, and a more gloriously hot and fine April I should think was never known. On the 2nd of the month I observed a female wasp out for the first time, and the forcing weather which had then set in soon brought them out in swarms. On their first appearance I as usual began to form suitable cavities in banks, &c., for the reception of nests, and on the 19th I took out from one of these cavities my first specimen; it belonged to Vespa Germanica, and consisted of a single cell at the extremity of a foot-stalk. On the following day a nest of V. sylvestris was discovered attached to a branch of a creeper growing beside a cottage-porch; one covering of this nest had been completed, a second was far advanced towards completion, and a third had been begun. It contained a small comb consisting of nine cells, in six of which eggs had been deposited. This nest must have been begun during the first, or at any rate before the middle of the second, week in April—a period unprecedentedly early, so far as my experience goes. Some idea of the number of queen wasps frequenting the neighbourhood this season may be formed when I state that, sitting quietly for half an hour the other evening upon a spot around which were numerous deserted burrows of the

common mole, I observed no less than seven individuals enter these burrows, where each of course had begun to form a nest within a few yards of me; and yesterday (28th April) on examining a portion of the cavities or chambers I had recently formed, I found that as many as thirty-five of them had become tenanted. There were nests of all the four species most generally distributed, Vespa Germanica, V. vulgaris, V. rufa and V. sylvestris; while all around might be seen individuals still in search of eligible building sites."

The President exhibited some young dog-ticks, quite recently hatched from eggs laid in May by the identical female Ixodes which he had taken away from the February Meeting of the Society (*ante*, p. 82), and which he had mentioned at the March Meeting (*ante*, p. 85) as having been re-captured when attempting to escape after having been gummed down to a card for a fortnight.

New Part of 'Transactions.'

The first Part of Trans. Ent. Soc., Third Series, vol. iv., containing the commencement of Mr. J. S. Baly's Revision of the Malayan Phytophaga, was on the table.

August 7, 1865.

F. P. Pascoe, Esq., President, in the chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Proceedings of the Royal Society,' Vol. xiv. Nos. 73—76; presented by the Society. 'Verhandlungen der Kaiserlich-Königlichen Zoologisch-botanischen Gesellschaft in Wien,' Vol. xiv.; by the Society. 'Annales de la Société Linnéenne de Lyon,' Nouvelle Serie, Tome x.; by the Society. 'Annales des Sciences Physique et d'Histoire Naturelle, d'Agriculture et d'Industrie, publiées par la Société Imperiale d'Agriculture, &c., de Lyon,' 3e Serie, Tome vii.; by the Society. 'Ueber einige Pflanzenverwüster,' 'Entomologische Fragmente,' 'Zoologische Miscellen,' by Georg Ritter von Frauenfeld; by the Author. 'Cecidomyia destructor, *Say*, Wezengallmücke oder Weizenverwüster,' 'Ueber eine bisher wenig beobachtete Getreidemotte Tinea pyrophagella, *Kllr.*'; by Prof. Haberlandt; by the Author. 'Ueber Getreideverwüster;' by the Author, Gust. Ad. Künstler. 'The Zoologist' for August; by the Editor. 'The Entomologist's Monthly Magazine' for August; by the Editors.

The addition, by purchase, was also announced of C. G. Thomson's 'Skandinaviens Coleoptera,' Vol. 7, Part 1.

Election of Members.

The Rev. Joseph Greene and Messrs. H. S. Gorham, H. Blake-Knox and Thomas Parry, were elected Members; and Mr. W. Rogers was elected an Annual Subscriber.

Exhibitions, &c.

Mr. M'Lachlan exhibited one living and numerous dead specimens of the ant-lion (*Myrmeleon formicarius*), together with the pupa-cases, and the larva and pupa in spirits; he had brought the larvæ from Fontainebleau in August, 1864, and fed them on house-flies; they remained torpid for about five months during the winter,

and the perfect insects emerged at Forest Hill from the middle of July to the 5th of August.

Mr. W. Wilson Saunders exhibited a living specimen of a species of Locustidæ of a bright delicate green colour, of which he gave the following account:—About four months ago, Mr. Marshall, of Edmonton, gave him three small locustideous larvæ which were found in an Orchid-house, into which some Orchids from Mexico had been recently introduced; these larvæ were taken to Reigate and placed in an Orchid-house under a glass cover, but as they were very sluggish and appeared to be dying, Mr. Saunders' gardener proposed to allow them a little fresh air; the result was that all three escaped, and for three weeks nothing was seen of them. At the end of that time one of them was found eating the under side of the leaf of a Cymbidium; having been returned to its glass case, and again allowed to inhale fresh air, it again effected its escape, upwards of two months ago; four days before the Meeting the specimen exhibited was found, after it had completely spoilt a new Orchid (Cyanophyllum, *n. sp.*). It turned out that the creature was entirely nocturnal in its habits; by day it sat on a branch or leaf with its wings flat to the surface, the hind and middle legs hidden under the elytra, and the fore legs stretched straight out, with the antennæ between and beyond them; in this position it was with difficulty distinguished from the plant, and throughout the entire day it remained perfectly still, but at night was active and ate ravenously. The insect seemed to be remarkably fond of wiping or cleansing its feet and antennæ; and throughout its exhibition the process of gradually drawing the whole length of its antennæ through the palpi was carried on.

Mr. Bates thought the fact of a locust feeding by night was new, and nocturnal habits were the more remarkable in an insect of so bright a colour; he had met with upwards of fifty species in South America, but did not remember one that was nocturnal. The species exhibited belonged to the section of the group having the ovipositor curved upwards from the base and sabre-shaped (probably to the genus Steirodon), which suggested the question whether they laid their eggs from below, on the under side of leaves. It was well known that the males of this family possessed a drum-shaped organ on one wing-case, and a horny nervule like a file on the other wing-case, by means of which they were able to produce sound; there was one species which was collected by the natives of the Amazons and kept in cages for its musical qualities, as we keep canaries.

Prof. Westwood pointed out that the insect exhibited was not the locust of common parlance, but belonged to the Gryllidæ; he also explained that the sound-producing organ was a tambourine, rather than a drum; and he suggested that the specimen was East Indian, not American.

Mr. M'Lachlan mentioned that a small species of Gryllus (Meconema varia?) often paid nightly visits to the sugar of Lepidopterists.

The President said that he had requested further information from Mr. Odewahn respecting the mode of production of the sound emitted by the Australian Bolboceras which he had exhibited at the April Meeting (*ante*, p. 88); it appeared that the sound was caused by the rotation of the hind coxæ in the cotyloid cavity; striæ were visible on the dorsal surface of the coxæ, and similar but smaller striæ within the cavity.

Mr. Edward Saunders exhibited Trachys pygmæus, recently captured by sweeping in marshy ground near Lowestoft.

Mr. D. Sharp exhibited Cryptocephalus 10-punctatus, and the black variety

Bothnicus of Linnæus, from Rannoch; of the typical form he had found only the female, but of the black form both sexes.

Mr. D. Sharp also exhibited a number of the larvæ of Eros Aurora, from Rannoch; they were found gregariously amongst rotten pine-chips, and though not (he supposed) naturally pupivorous, they had whilst in his possession fed principally on the pupæ of other insects which happened to be in the same place of confinement; both larvæ and imago were very sluggish in their habits.

Prof. Westwood, on behalf of Mr. Wilson Armistead, of Virginia House, Leeds, read the following:—

"Located in the midst of a smoky town and district, chiefly noted for its manufacturing industry, I am desirous of obtaining the aid of my friends who are more favourably circumstanced, in elucidating a somewhat neglected portion of Nature's productions. I allude to those curious excrescences, popularly known as Galls. These are caused by the punctures of insects, chiefly Cynips, and are found of various forms on the oak, the rose, the willow, the speedwell, and many other trees and plants, sometimes presenting a very dissimilar appearance on the same plant, according to the insect by whose enchanting wand they are, as if by magic, brought forth. It is matter of surprise that these 'little fairy palaces,' as they have been aptly called, so exceedingly varied and beautiful—some round as an apple, tinted like it, red and yellow; others like unripe currants; some resembling a honeycomb; some again miniature artichokes; some velvet cushions; some coral beads; and others tufts of moss—it is matter of surprise, I say, that these should have attracted apparently so little attention. They are, however, now claiming a greater share of notice. Two or more continental observers have published works specially relating to them, one on the Galls of Switzerland, by M. Berni, and another by Dr. Hammerschmidt, who has made the subject one of much research, giving drawings of 250 different kinds, and the insects producing them. A good deal has also been done during the last few years towards elucidating the American Galls. Count Osten-Sacken, the Russian Consul-General, has been a chief originator of some researches into them, followed up by Mr. Walsh, of Illinois, who has contributed valuable information respecting them to the Entomological Society of Philadelphia, published in their 'Proceedings.'

"Having myself been an observer of Galls and similar excrescences for twenty years or more, and having collected most of the British species, and some American ones during a visit to that country, I am preparing a volume to contain the result of these observations. This work will include drawings and descriptions, with some attempt at classification. *A coloured drawing of each* will be given where practicable, *and a description of every known Gall*, as far as my own observation extends, including those described by others, not omitting some similar excrescences known as pseudo- or semi-galls, whose production may be variously accounted for. An artist in London has been engaged to make drawings from specimens for the volume now proposed, and he has already produced some beautiful and faithful delineations. Being desirous of making the work as complete as possible, I shall esteem it a favour if any naturalist who may have observed or may possess any galls, wherever found, not hitherto known or described, would communicate with me, and furnish any particulars respecting them.

"I may add that I am in want of specimens to draw from of the leafy gall occurring on Genista tinctoria, of which I have description, but have not succeeded in meeting with it; also the cottony or woolly gall of the oak."

Mr. S. Stevens exhibited a collection of butterflies recently received from Mr. P. Bouchard from Santa Marta; and read a letter from that gentleman, dated the 30th of June, 1865, in which the writer stated that they were collected about 100 miles in the interior, in a valley about seventy miles west of the Snowy Mountains, and about the same distance from the Magdelena River; they had been brought from the interior on a mule's back; the writer had obtained very decent apartments in a house where the next neighbour was thirty miles off, was in good health and spirits, and had become used to the heat of the country.

Lieut. R. C. Beavan sent from Calcutta some exquisite drawings of the Tusseh silk-worm and moth, which were exhibited.

With reference to a statement in the 'Journal of the Society of Arts' of the 4th of August, 1865, that "the silk-worm culturists in France announce the birth or hatching of the larva of Bombyx Atlas; this gigantic moth has never before been seen alive in Europe," Mr. F. Moore mentioned that he had bred Bombyx Atlas in London more than a year ago.

Prof. Westwood had been informed that the Yamamai silk had entirely failed this year in Holland. He had recently reared some of the Ailanthus silk-worm, and found them sluggish in habit, feeding only at night; with the exception of young larvæ, less than half an inch long, he never found one to feed by day; when a moult took place, and immediately after it had escaped from the old skin—at a time therefore when any movement must be inconvenient to it—the larva invariably turned round and at once ate up the old skin; he had noticed that the skin was covered with a light powder, and this appeared to be the attraction to the larva.

Referring to Mr. Stone's communication, read at the previous Meeting (*ante*, p. 105), on the number and early appearance of wasps, Mr. Stainton remarked that though wasps were so numerous in the spring, there were scarcely any at the present time, when fruit was abundant and ripe; for some weeks past he had seen two wasps and two only.

Mr. W. W. Saunders corroborated Mr. Stainton as to the almost entire disappearance of wasps, whereas earwigs were more plentiful than ever.

Prof. Westwood had not seen a wasp for two months; he thought their absence was to be accounted for by the remarkably heavy rain-falls which had occurred on two or three occasions, in May, in June, and more recently, whereby the nests had been swamped.

Mr. Saunders replied that that explanation was not applicable to the neighbourhood of Reigate, where the rain-fall, taken month by month, was not so great as last year, when wasps were exceedingly abundant; and there had not been any single rain-fall of one inch, whereas in previous wasp-abounding years, as much as three inches had been registered at a single rain-fall.

Mr. Stainton observed, moreover, that a heavy rain-fall was local only, whilst the extinction of the wasps appeared to be general.

Mr. C. A. Wilson, Corresponding Member, of Adelaide, communicated the first portion of some "Notes on the Buprestidæ of South Australia," which was read.

Mr. Dunning exhibited a curious specimen of Fidonia piniaria, which he had captured on the 11th of June, 1850, in a pine wood at Farnley, near Huddersfield. It was well known that the sexes of this moth were very different in appearance, and were described by Linnæus as two species, the male as Phalæna piniaria, "alis fuscis,

bimaculatis; antennis pectinatis," the female as Phalæna tiliaria, "alis ferrugineis; antennis setaceis;" the specimen exhibited was what a hybrid between piniaria and tiliaria might have been expected to be, if those forms had in fact been two species instead of the sexes of one. The specimen was sexually a female, and the abdomen was apparently distended with eggs; the general colour was midway between the colours of the ordinary male and female, but the size and the markings were those of the male. He had been puzzled to know how to describe it; he would not be without precedent if he called it a "hermaphrodite," or, adopting the nomenclature of Mr. Newman (Zool. for 1851, Appendix, p. cxl., where the distinct phenomena often confounded under the term hermaphrodite were classified), a "hemigynous" specimen. Mr. Dunning doubted, however, whether an union in the single individual of the *structural* differences between the sexes was not necessary to constitute hemigynism, or whether an individual which presented the structure of one sex throughout, but the colour and external markings of the other, was properly hemigynous; such an individual was abnormal, certainly, but were the superficial differences from the typical form anything more than skin-disease or cutaneous eruptions? The absence of any "addition to or alteration of a part or organ" prevented the application of the theory of "dimorphism" as enunciated by Mr. Pascoe (*ante*, p. 15); and the isolation of the case excluded alike the "polymorphism" and "local form" of Mr. A. R. Wallace (*ibid*; and Tr. Linn. Soc. xxv. 5, 10), and the theory of "mimetic resemblance" of Mr. Bates, to establish any of which a solitary example was insufficient, and a large number of instances—a more or less permanent race—was required. There seemed to be nothing left but to fall back upon the old term "variation;" at the same time the variation was not simple, casual, aimless, but in a definite direction, as if designed; it was the case of a female retaining essentially her sex, but having an unmistakeable bias or tendency to assume the garb and outward appearance of the male; he would exhibit the insect as Fidonia piniaria, an andromorphous variety of the female.

Mr. J. J. Weir suggested that "dichromatism," a "dichromatic variety," would denote the phenomenon in question.

Prof. Westwood hoped never again to have heard the word hermaphrodite applied to the abnormal forms under discussion; the best and only proper term was that given by Prof. Lacordaire, "gynandromorphous." He thought that, at all events some cases, where the differences were external only and not structural, were truly cases of gynandromorphism. For instance, he had an Orange-tip butterfly (*Anthocharis Cardamines*), which was female in every respect, except that on the tip of one fore wing were about a dozen of the bright orange scales which characterized the male; he regarded that specimen as possessing in itself the rudiments of two distinct creatures, a male and a female, and that the female influence had so far predominated as to have absorbed the male, except in that small portion of the wing where the male influence prevailed. With respect to variation generally, no attempt to classify the various forms and phases of it had yet been made; the subject was a wide one, but it would have to be dealt with, and in the hands of a Darwin might be made of surpassing interest and value.

Paper read.

Mr. J. S. Baly read a paper entitled "Descriptions of New Genera and Species of Phytophaga." Twenty-one species were described, five belonging to the Eumolpidæ, the remainder to the Galerucidæ; two new genera were characterized under the name of Hylaspes and Buphonida, both of the subfamily Galerucinæ.

September 4, 1865.

Frederick Smith, Esq., V.-P., in the chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'The Transactions of the Linnean Society,' vol. xxv., part 1; presented by the Society. 'Bulletin de l'Academie Royale des Sciences, &c., de Belgique,' 2e série, t. xviii., xix.; by the Academy. 'Proceedings of the Boston Society of Natural History,' vol. ix. (part); by the Society. 'Annals of the Lyceum of Natural History of New York,' vol. viii., Nos. 1, 2, 3; by the Lyceum. 'Monographs of the Diptera of North America,' part 2, by Loew and Osten-Sacken; by the Smithsonian Institution. 'Notes on Humble Bees,' and 'Notes on the Leaf-cutting Bee,' by F. W. Putnam; by the Author. 'The Humble Bees of New England and their Parasites,' by A. S. Packard, jun.; by the Author. 'Remarks on some Characteristics of the Insect Fauna of the White Mountains, New Hampshire,' by S. H. Scudder; by the Author. 'On the Hymenoptera of Cuba,' by E. T. Cresson; by the Author. 'Catalogus specierum generis Scolia,' part 2, by H. de Saussure and J. Sichel; by the Authors. 'Stettiner Entomologische Zeitung,' 1865, Nos. 7—9; by the Entomological Society of Stettin. 'Notice sur John Curtis' and 'Rectifications de la Nomenclature de plusieurs Espèces de Phasmides recemment décrites,' by J. O. Westwood; by the Author. 'The Zoologist' for September; by the Editor. 'The Entomologist's Monthly Magazine' for September; by the Editors.

The addition, by purchase, of the 128th livr. of Duval, Migneaux et Fairmaire, 'Genera des Coléoptères d'Europe,' was also announced.

Election of Members.

Herr L. W. Schaufuss, of Dresden, was ballotted for and elected a Foreign Member. The Rev. Sir C. R. Lighton, Bart., and H. T. Wood, Esq., were severally ballotted for and elected Annual Subscribers.

Exhibitions, &c.

Mr. Bond exhibited an andromorphous female and a gynæcomorphous male of Fidonia atomaria, thus showing each sex in the garb of the other: coupling this with the exhibition at the previous Meeting of the andromorphous female of Fidonia piniaria (*ante*, p. 109), it seemed not unlikely that this peculiar form of variation might be found to run through all the Fidoniæ.

Mr. Bond also exhibited two specimens of Gonepteryx Rhamni, one of which, a male, had a broad stripe along the costa of the left anterior wing of the pale colour peculiar to the female, whilst the other, a female, had large patches of the right anterior wing of the deep colour peculiar to the male: he regarded these as simple varieties, and not as cases of gynandromorphism or of the union or blending together of the two sexes in the same individual.

Mr. Bond also exhibited a variety of Ennychia anguinalis, having a broad patchy whitish marginal band on all the wings, external to the usual narrow white fascia.

Mr. W. F. Kirby exhibited a dwarf male specimen of Polyommatus Icarus (Alexis) measuring only 8½ lines in expanse of wings. This pigmy was captured by Mr. Kirby about the 20th of July last at the salt marsh at Hove, near Brighton, and except in its diminutive size did not present any variation from the ordinary form of the insect, which was then very common in that locality.

Mr. Stainton exhibited a highly-magnified coloured drawing of the larva of Laverna subbistrigella, together with pods of Epilobium montanum in which the larvæ had fed, and which had, in consequence, a somewhat stunted and deformed growth: the habit of the insect was discovered at Wiesbaden, and Mr. Barrett had this year detected the larvæ at Haslemere, where the imago had previously been captured.

Mr Stainton (on behalf of Mr. Dorville) exhibited a specimen of Caradrina cubicularis having a number of red Acari symmetrically arranged upon its wings.

Mr. Stainton mentioned that he had this year noticed an unusual abundance of Chelifers on the legs of house-flies; the natural place for Chelifers would seem to be amongst vegetation, and Dr. Hagen was of opinion that they attached themselves to flies only for the purpose of locomotion; with this he could not agree, for the Chelifer, according to his observations, never quitted a fly to which it once attached itself, and the fly was powerless to get rid of it. On one occasion he had seen a fly with three Chelifers on one of its legs.

Mr. M'Lachlan exhibited both sexes of Æshna borealis (*Zetterstedt*), taken by him at Rannoch in June last. This dragon-fly was previously known as British by a single example only, captured many years since in Scotland by Mr. Wilson, and now in the collection of De Selys Longchamps.

Mr. M'Lachlan also exhibited Sialis fuliginosa (*Pictet*, *Brauer*), a species new to Britain, and taken at Rannoch. There were but two European species of this genus, and both had now occurred in this country.

Mr. M'Lachlan also exhibited two new British Trichoptera; one, a Rhyacophila, from the neighbourhood of Edinburgh, allied to, if not identical with, R. ferruginea (*Hagen*); the other a Stenophylax, from Rannoch, for which he proposed the name of S. infumatus.

Mr. S. Stevens exhibited a box of Coleoptera, part of a collection made in Damaraland by the well-known traveller Mr. Andersson; amongst them were a Phryssoma, a Manticora (latipennis?), several species of Goliathus, G. Burkei, G. Layardi, and an Eudicella, *n. sp.*, allied to E. Smithii.

Prof. Westwood gave an account of a visit to the Exhibition of Insects and Insect-products, which was opened at Paris on the 15th of August last. He mentioned particularly some bee-hives which were sold for 1f. 25c. each; and an octagonal bar-hive, which was so constructed as to be capable of division into two distinct hives: *à propos* of the silk-products, he mentioned that the silk-merchants were beginning to import Ailanthine as an article of commerce, and that certain experiments had recently been made at Toulouse with a view to test the quality of the Ailanthus wood; the tenacity and density of Ailanthus (as given by three experiments) and of elm and oak (as given by seven experiments) were comparatively as follow:—

	Ailanthus.	Elm.	Oak.
Tenacity . . .	32·812	24·867	19·743
Density . . .	·713	·604	·751

Prof. Westwood added that he had recently observed one of his full-grown larvæ of Saturnia Cynthia, which had been fed on its natural food, the Ailanthus, had emitted from the anus one or two large drops of fluid: prior to their change to the pupa state larvæ generally expelled as much fæcal matter as possible; but was this fluid discharge to be regarded as part, or an extension, of the same phenomenon? was it the natural habit of the creature, or a symptom of disease?

Mr Stainton referred to Duponchel's account of the larvæ as affected with "une légère diarrhée" when nearly full fed.

Mr. F. Moore had not observed any of his larvæ of Saturnia Cynthia to be similarly affected; and he had fed some of them on Ricinus communis.

The Secretary read the following, communicated by Mr. S. Stone, of Brighthampton, under date of the 2nd of September, 1865:—

"*Scarcity of Wasps.*—The immense falling off in the number of anticipated wasps' nests which has taken place is most extraordinary. I had occasion to remark in the spring on the swarms of queen wasps which made their appearance, and on the unusual number of nests that were then to be found, I myself having observed no less than thirty-five in one day (April 28th), but one after another became deserted, some in a few days after their commencement, others at periods more distant, till all had become tenantless, none having attained to a size larger than about that of an orange. I have found during the season sixty-one nests, but at the present time only two of the number are progressing; the others I added, as fast as they became deserted, to my collection. The two above mentioned I removed some time ago to the interior of a warm room in a house I have used for the purpose of rearing wasps and observing their habits for some years past, where the work is at present being carried on; but I am in daily expectation of seeing the insects succumb to disease, as was the case with two other colonies I previously had at work in the same room: all seemed to be going on well with them till the 5th of August, when a sudden diminution in the number of workers, and a cessation from work, took place in both nests simultaneously; and on examining them two or three days afterwards I found that nearly all the workers had disappeared, and that all the larvæ had sickened, died, and were in an advanced state of decomposition, having turned perfectly black: and this was also the case with very many of those that had spun themselves up and changed into pupæ; whence I infer that an epidemic more fatal in its character than that of last year, earlier in its appearance, and far more wide-spread, attacked the family of social wasps, and has resulted in their almost total destruction. That earwigs (which swarm to an extent I never before witnessed), wood-lice and ants have been in some degree instrumental in causing the destruction of nests, especially during the earlier periods of their formation, I have had abundant opportunities of proving; still that would hardly account for the universal destruction that has occurred. I did not find that more nests became deserted during the short periods of rain we occasionally had than during periods of the most charming and delightful weather, or that nests situated in moist ground fared worse than those in very dry situations."

Mr. Baly mentioned that, contrary to what seemed to be the general experience, wasps were this autumn abundant near Aberdeen.

Mr. F. Smith had spent the month of August at Bournemouth, and had not seen a single wasp, whereas in the same month of the previous year he could have obtained in the same locality twenty or thirty nests any morning: he thought it not improbable

that wasps were actually *starved* to death during a long continuance of wet weather; this, however, would not account for their present disappearance.

Prof. Westwood said that one of his correspondents had lately inquired of him whether earwigs were injurious to bees; Mr. Stone's communication answered the question with respect to wasps, and he had no doubt that earwigs, which were this year unprecedentedly numerous, were equally injurious to bees, penetrating the hives and consuming the larvæ.

Mr. Bond read, from the 'Standard' newspaper of the 2nd of September, the following extract from the letter of a correspondent at Coburg:—

"In the centre of the town stands the large and handsome church of St. Maurice, built in the early part of the fifteenth century, and having two towers, one unfinished, as is often the case (and history gives the reason here, that Tully, in the Thirty Years' War, carried off the money applicable to the purpose), the other reaching to a total height of 263 feet, of which the uppermost part is placed over an open belfry, and has a spiral termination of wood, covered with copper, out of which rises a long spindle, at the top of which is a golden ball, and above that again is the weather-cock. Shortly before five o'clock in the afternoon of the 28th of August, smoke was seen to issue from the small spire above the belfry. The news soon spread that the church-tower was on fire; the fire alarm was given, according to the German fashion, from the church-tower itself, the brigade of volunteer firemen donned their helmets, and rushed in all haste from their ordinary vocations to the post of danger, an express messenger was sent to the burgomaster, who was gone to a neighbouring village, and the whole population turned out to see the curl of smoke gradually ascending and dissappearing in the clear blue sky above. Nor was their anxiety for the old church without cause; twice before in its history, once in 1807 and again in 1812, had the lightning set this very tower on fire. But whence now could the fire have come? The spot whence the smoke issued was far above any place in the tower ever used or visited; the day was bright and clear, and there had not been, and was not, any sign of a storm; the heat of the sun, it is true, was excessive, but no one could remember an instance where fire had been kindled by the lord of day. Whilst the spectators eagerly discussed these questions, hundreds of eyes were watching the ascent of the firemen from point to point until they reached the belfry under the spire; a scaffold was there hastily constructed, upon which a ladder was raised and the cause and seat of the fire closely investigated. Sundry motions of the fireman on the ladder on high excited no little mystery below, for he seemed to be engaged in conflict with wasps or other warlike insects. The news soon sped to earth that the cause of all this commotion was millions of ants which had settled in countless numbers upon the steeple; indeed, all over the upper part of the tower: and as they rose to perform their gyrations in the air had created that appearance of smoke which could not be detected as a counterfeit from below. The mysterious motions of the man on the ladder were now explained. They were his attempts to beat off his insectile companions from himself, upon whom they were quite as disposed to settle as upon the church steeple itself. I am not sufficiently acquainted with insect life to be able to speak scientifically as to the genus of ant that succeeded in so distinguishing itself; but having seen several that were brought down from the spire, I am able to say that they were an ant of a reddish colour, slightly larger than our common black ant, and of course furnished with wings."

Mr. Wormald had seen something very similar at St. Albans on the 26th of August, when a swarm of small black ants presented the appearance of smoke issuing from the Abbey.

Prof. Westwood directed attention to the remarkable form of Pteratomus, a Hymenopterous insect, as figured by Mr. Packard in his paper "On the Humble Bees of New England and their Parasites;" the anterior wings were divided or cleft like those of a plume-moth (Pterophorus).

New Part of 'Transactions.'

A new Part of the 'Transactions' (Tr. Ent. Soc., 3rd Series, vol. iii. Part 2), containing Mr. Pascoe's "Longicornia Malayana" (continuation), and being the third Part published during the present year, was on the table.

October 2, 1865.

F. P. Pascoe, Esq., President, in the chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'The Journal of the Royal Agricultural Society of England,' 2nd Series, Vol. i. part 2; presented by the Society. 'Proceedings of the Royal Society,' No. 77; by the Society. 'The Transactions of the Entomological Society of New South Wales,' Vol. i. part 3; by the Society. 'Hübner (Jacob), Verzeichniss bekannter Schmetterlinge;' by W. F. Kirby, Esq. 'Exotic Butterflies,' Part 56; by W. W. Saunders, Esq. 'Revision of the hitherto-known Species of the Genus Chionobas in North America,' by Samuel H. Scudder; by the Author. 'The Zoologist' for October; by the Editor. 'The Entomologist's Monthly Magazine' for October; by the Editors.

Exhibitions, &c.

Mr. W. F. Kirby exhibited a female specimen of Sterrha sacraria captured by his brother near Brighton, on the 18th of July last.

Mr. J. J. Weir exhibited three specimens of Xylina petrificata, one of which bore great resemblance in colour to X. semibrunnea.

Mr. W. F. Evans exhibited two malformed specimens of Vanessa Atalanta; one of which, caught near Bradford, Yorkshire, in 1864, had the left antenna only half the length of the right, notwithstanding that it possessed the usual number of joints; the other, bred from the larva at Herne Bay, in August, 1865, had the wings on one side considerably larger than on the other.

Dr. Alexander Wallace mentioned that a specimen of Argynnis Lathonia had been seen, but not captured, by Mr. Harwood, at Colchester, during the previous week, a rather unusual time for its appearance.

Mr. Bond exhibited dried larvæ of Acherontia Atropos, Sphinx Ligustri and Macroglossa Stellatarum, preserved by Mr. Baker, of Cambridge, and retaining their colour as in life.

Mr. S. Stevens exhibited a box of butterflies, collected in Labuan by Lieut. de Crespigny.

Mr. M'Lachlan exhibited specimens of two species of Stenophylax, which had been sent to him by the Rev. G. F. Browne, St. Catherine's College, Cambridge, and which, together with an Ichneumon of the genus Paniscus, had been found in an ice-cave in the Swiss Alps. In reply to Mr. Browne's enquiry how the insects came to be in such a situation, he (Mr. M'L.) had been unable to give any explanation which was applicable to the Ichneumon, but with respect to the caddis-flies he had suggested that the cave might be connected with the outer world by some subterranean passage or stream, up the course of which the larvæ had travelled. This had drawn from Mr. Browne the following:—"There was no communication with the outer air. These flies were found at a very considerable depth in the earth, down a rock-fissure, a good hundred feet below our point of entrance, which was itself low down in a face of rock. At the bottom of this we came to a chamber, one corner of which was shut up by a curtain of ice—hermetically sealed up. We hewed a hole through it—all was utterly dark—and found only ice within, with a narrow low passage, about two feet each way, leading lower still into the earth; stones sent down gave the sound of water. The ice-roof of the ice-trough was thickly studded with these flies, standing still, but running swiftly when disturbed. I caught two, lying flat on my back and lowered by a rope. The other two were found on my dress and beard when I was dragged up again. The three that are alike [the Trichoptera] I have found in other ice-caves; the fourth, something like a huge flying ant [the Ichneumon] I have not found in such situations. Every one's idea must have been, What *could* they want with eyes?"

Mr. W. W. Saunders exhibited the bulb of an Orchid from New Grenada, which was covered with and had been destroyed by two species of Coccus: the insects fixed themselves on the bulb, which soon became wizened and withered, and the plant died under their suction. Both species were of the kind known to gardeners as "limpet-scales," one of them being about twice as long as broad, whilst the other was round and expansive, and looked like the half of a little bivalve shell; the young ones might be killed by washing the plant with a mixture of water and spirits of wine, but when they grew older and had a hard case over them this ceased to be effectual; and if poisons were applied to kill them they reached the root and killed the plant likewise. There seemed to be a continual development of these pests, and an entire absence of periodicity in their appearance; young ones were produced continually, and, though search had been made both by day and night, not a single male had been observed.

Mr. S. S. Saunders exhibited numerous specimens, preserved in spirit, illustrative of the transformations of the Strepsipterous insect, Hylechthrus Rubi: amongst them were, the apod larva in a Hylæus nymph, another exposed by removal of the last segments of the Hylæus, and one extracted entire; a male nymph in the pupa-case, the operculum apart; a male imago with its wings erect, the pupa-case and operculum apart; females on their first protrusion, and another extracted entire on the second day. Also a parasite on Polistes Gallica, with the larvæ of each.

Mr. J. J. Weir enquired the use of the anal appendages of the earwig; there was no doubt that Staphylinidæ used their appendages for the purpose of closing or pressing in the wings after flight, and he believed it was mentioned in Kirby and Spence that earwigs occasionally used theirs in opening their wings; he had observed the small earwig (*Labia minor*) perform in this manner; the wings were partially protruded, and then pulled out by means of the appendages, and he had come to the con-

clusion that this was the natural function, or at all events one of the functions, of those organs, and doubted whether the wings could be expanded without the use of the appendages.

Prof. Westwood was inclined to think that the appendages were more ornamental than useful, and that their use, if any, was rather for the purpose of defence.

Mr. S. H. Scudder, Sec. Nat. Hist. Soc. of Boston, U. S. A. (who was present as a visitor), exhibited two fossil specimens (one the reverse of the other) of a gigantic Ephemera, which must have measured five inches in expanse of wings. This with some other fossil insects had been found by Mr. Hartt in the Devonian series of North America, in a ledge of rocks which ran out to sea, so that they could be examined only at low tide; and respecting them Mr. Scudder read the following note:—

"*On the Devonian Insects of New Brunswick.*—There are in all ten specimens in Mr. Hartt's most interesting collection of the fossil remains of insect-wings from Lancaster, eight of which are reverses of one another, thus reducing the number to six individuals; of these, one, a mere fragment, belongs, I think, to the same species as another of which the more important parts of the wing are preserved, so that we have five species represented among these Devonian insects, and these remains are all, I suspect, composed of portions of the anterior wing alone. The data being thus fragmentary, the conclusions cannot be quite so satisfactorily determined as we could wish, but we can still discover enough to prove that they are of unwonted interest. Besides the peculiar interest which attaches to them as the earliest known traces of insect life on the globe, there is very much in themselves to attract and merit our closest attention. One of them is a gigantic representative of the family of Ephemerina among Neuroptera, some three or four times the size of the largest species now living, with which I am acquainted. Another borrows some striking points of the peculiar wing-structure of the Neuropterous family Odonata, and combines with them those of families remote from that, and even belonging to a distinct section of the Neuroptera, exhibiting to our view a synthetic type which combines in one the Pseudo-neuroptera and the Neuroptera, and represents a family distinct from any hitherto known. Other fossil insects, found in carboniferous concretions in Illinois, and described in 'Silliman's Journal' (N. S. xxxvii. 34), which Prof. Dana has kindly allowed me to examine, also belong to hitherto unrecognized families, exhibiting similar relations to these in-our-day-disconnected sections of Neuropterous insects; and a third species of Mr. Hartt's is a member of still another family of Neuroptera, which finds its natural relations between the two described by Prof. Dana. A fourth, of which only an unimportant fragment was found, would seem to belong to the Neuroptera; but by some peculiarities of the minuter cross-veins, thrown off in the middle of the outer edge of the wing, in a most irregular and unusual manner, suggests no intimate relations with any known family, but must have belonged to a group of large and weak-winged insects. The fifth and last to be mentioned is of very striking interest, because, while it exhibits the peculiar venation which forms the well-known tympanum or stridulating apparatus of the male, in the Orthopterous family Locustariæ (though differing somewhat from that), it also most resembles the Neuroptera in all or nearly all the other peculiarities of its structure, and suggests the presence in the insect-faunæ of those ancient times of a synthetic type, which united the characteristics of the Orthoptera and Neuroptera, in themselves closely allied: this point, however, requires patient and severe investigation, and only my earliest

impressions are here recorded,—made, however, immediately after a close examination into the relations of other fossil insects. I earnestly hope that this locality, from which these remains were disinterred, may receive a most careful and thorough examination. Hitherto the study of fossil insects has been mainly confined to those of much more recent date, and has resulted in shedding comparatively little light upon geological and palæontological questions; but these few remains, coupled with the pair of insects found in Illinois, induce us ardently to anticipate that the future study of fossil insects, drawn from such ancient strata as these, may lead to as brilliant and important results, in the elucidation of geological problems still open, in widening the range of our palæontological horizon, and in our general knowledge of the history of life on our globe in all its bearings, as have been reached by the study of the remains of animals of a more substantial structure, but which have hitherto been denied to the student of fossil Entomology."

Prof. Westwood mentioned that at the recent Meeting of the British Association, Prof. Grube had exhibited a fossil spider from the coal measures, which was perhaps identical with one figured in Petiver's 'Gazophylacium.'

Mr. Scudder mentioned that in the Brodie collection were fossil forms very much resembling some American spiders.

Mr. C. A. Wilson, of Adelaide, communicated another instalment of his notes "On the Buprestidæ of South Australia."

Prof. Westwood directed attention to M. Henri Deyrolle's recent work, 'Description des Buprestides de la Malaisie, recueillis par M. Wallace'; Mr. A. R. Wallace's collection of Buprestidæ had become the property of Count Mniszech, and M. H. Deyrolle had described no less than 355 species of that family.

The Secretary read the following account, with which he had been furnished, of the recent

Paris Exhibition of Insects.—"This curious exhibition has attracted the attention of men of science and agriculturists, but most particularly of those who are interested in the rearing of bees and silk-worms, which naturally occupy the chief places. The collection of bee-hives, some shown in operation, and of other matters connected with the rearing and management of these interesting insects, is considerable, and presents forms, in some instances, strange to English eyes. In addition to the bees themselves are specimens of their products and of the articles into which they enter, such as honey, wax, mead or hydromel, sweetmeats and confectionary. The largest portion of the exhibition, however, was occupied by matters connected with the production of silk. An admirably arranged collection was shown by M. Jules Rieu, of Valréas, in the department of Vaucluse, including the white and yellow cocoons of the Japanese silk-worms, introduced into France in 1863, and extensively bred by M. Rieu; green cocoons also from Japan, introduced in the present year; silk spun from these various cocoons; models of the frames and other materials used in the silk cultivation; and specimens of the insects themselves in the various stages of their existence. M. Guerin-Méneville, M. H. Givelet, and others exhibited numbers of the Bombyx Cynthia, and of other worms produced by the crossing of the former with the Bombyx arrindia, feeding on the leaves of the Ailanthus, and also several chambers containing cocoons and hundreds of enormous moths depositing their eggs. Others show products, preparations and sketches of the Bombyx yamamai, a very large green worm that feeds on the oak, and of many other new and curious species. But the Ailanthus

worm seems to have attracted the greatest attention, and its cultivation is rapidly extending. M. Givelet, who published a report on the subject not long since, read a paper at the exhibition, and promises a more complete account of the best method of bringing this worm into cultivation on a large scale during the coming winter. This gentleman commenced planting the Ailanthus at the Chateau of Flamboin in 1860, and, after some misfortunes and disappointments, completely succeeded in the breeding and rearing of the worms. He reports that during the present season he has collected about twenty thousand cocoons, and that about three times that number are now on the trees in his plantation. The long continuance of hot weather had greatly favoured the experiments made in the rearing of Bombyx Cynthia. In the enclosure within the Jardin d'Acclimatation, in the Bois de Boulogne, may be seen at the present moment a large number of these worms of the third generation of this season, feeding in the open air on the Ailanthus, or spinning their cocoons. The creatures are of great size, and seem to be in perfectly healthy condition. The cocoons are generally formed at the extreme end of the branches, or rather of the leaves, for the Ailanthus has long compound leaves, with many leaflets, like the ash, where no bird, however light, could rest and make a meal of the occupant, and the worms take the curious precaution, before commencing the cocoon, to attach several threads of their web to the leaf-stalk as high as the third or fourth leaflet, so that, if that on which the cocoon is fixed were to be broken from its stalk, it would still be held pendant by these stay-threads. The Museum of Natural History at the Jardin des Plantes, contributed a fine collection of insects, with specimens of timber and other substances which have suffered from their ravages; also some remarkably large specimens of lobsters and crayfish from American waters. Another remarkable collection of insects is from Mr. T. Glover, the entomologist attached to the Department of Agriculture at Washington. M. E. Mocquerys, of Evreux, has an admirable exhibition of coleopterous and other insects which feed on the vine, cereals and other industrial plants. Dr. Eugène Robert contributed a series of sections of trees ravaged by xylophagous insects, together with illustrations of the methods which have been adopted by the authorities of Paris and other places, under his superintendence, for their destruction. There were other collections of more or less importance, and, amongst the curiosities of the exhibition, a landscape produced entirely by the arrangement of various coloured beetles. Apparatus and powders for getting rid of certain classes of noxious insects were numerous in the exhibition, amongst which, judging from the number of medals and awards granted to the discoverer, the powder produced from the flowers of the Pyrethrum Willemoti seems to hold the highest place. It appears that the flowers of various plants of this family are extensively used in Persia, Armenia, and other countries, for like purposes. The Persian powder is said to be composed chiefly of the flowers of the Pyrethrum carneum, while the Armenians prefer the Pyrethrum roseum."

Dr. Alexander Wallace exhibited living specimens of Bombyx Cynthia in all its stages,—eggs, larvæ in four successive stages, cocoons and imago,—bred by him during the present year; also a branch of the Ailanthus glandulosa, having attached it to a paper cot containing eggs, to illustrate the mode in which the eggs were placed on the living tree out of doors the evening before hatching out. He also exhibited the mode of keeping the cocoons during the winter, strung up in chaplets of fifty each; the perforated zinc cylinders in which the moths were retained for copula-

tion and the laying of eggs; the method of gathering and hatching out the eggs; and specimens of the silken thread which the larva before spinning the cocoon wove from the foundation of the cocoon along the leaf-stalk to the bough, so that though the leaf-stalk in winter became detached from the bough the cocoon would still remain suspended instead of falling to the ground. Specimens of the silk obtained both by carding and winding were also shown, and several hundreds of the cocoon and imago were distributed amongst the Members present. Dr. Wallace believed he was the first person in England who had attempted to rear the Bombyx Cynthia on an extended scale out of doors without any protection; Lady Dorothy Nevill was the first in this country to rear the species successfully, but this was done under the protection of nets; he was under great obligation to Lady Dorothy for having in the first instance supplied him with eggs, and with specimens of the Ailanthus; he had, in March, 1864, planted out by the side of a railway (*vide ante*, p. 30) 3000 Ailanthus trees, which were then two years old; some died owing to the prolonged drought in spring, and during that year their growth was scanty; but in 1865 their growth had been very rapid, shoots six feet long and an inch in diameter having been put forth by many: the soil was a close loam. He had made another small plantation in his garden for the purpose of observation and to serve as a nursery; on this he had placed 18,678 eggs, which were laid between the 1st and 22nd of July; they were laid in the interstices or perforations of the zinc cages, rubbed off upon blotting-paper, and a glass placed over them; the paper could be moistened if necessary; in twelve or fourteen days, according to the greater or less heat, the eggs hatched, prior to which, however, batches of them were pinned in paper cots or bags on the trees in the nursery: once established on the trees, the larvæ grew continuously, and when about half-grown they were transferred to the trees in the larger plantation, and distributed over them; from these he had, in September last, harvested 5318 cocoons, very few of which were ichneumonized. No larvæ were observed to be eaten by birds, though sparrows were abundant, and were seen to pick off the Aphides from cabbages growing under the Ailanthus trees; he had lost about 200 by disease; but the greatest destruction was in the nursery during the first two changes, when spiders, lady-birds, earwigs and Carabi thinned their numbers to some extent; in 1864 wasps were observed to carry off the young larvæ, and likewise ants; there appeared also to be a parasitic fly (Tachina), and tom-tits were destructive to the larvæ. The growth of the tree was most surprising, and after the leaves had been entirely consumed by the silkworms, another growth of foliage was emitted sufficient to nourish a second brood of worms. Of his first brood, 563 moths hatched between the 22nd of May and the 27th of July; of these 230 fertile pairs were obtained; their eggs were laid from the 24th of May to the 26th of July, and were 37,000 in number; the first larva from these hatched on the 11th of June, spun up on the 15th of July, and emerged on the 20th of August. Of another batch of larvæ, the eggs of which were laid on the 6th and 7th of June, the first hatched out on the 23rd of June, spun up on the 20th of July, and emerged as a moth on the 23rd of August,—an interval of thirty-four days,—which was spoken of in France as a short period for the egg to develope into a cocoon, whereas in this instance the change took place in twenty-eight days. Of his second brood, 101 moths hatched between the 21st of August and the 21st of September; thirty-six fertile pairs were obtained; their eggs were laid from the 23rd of August to the 7th of September, and were 3438 in number; the first larva from these hatched on the 7th of September, the last on the 19th of September,

and the first would in two or three days from that time be undergoing the last moult prior to spinning. Thus, owing to the extraordinary warmth of the season, a second brood would be obtained, and, by commencing earlier in the year than he had done, this might be made more certain; indeed Lady Dorothy Nevill had her second brood spun up in cocoon in September. The silk was for the first forty-eight hours quite white; it then became moist, especially at the lower end of the cocoon (perhaps from some emission of the caterpillar), and the colour changed to dirty gray. The larvæ, cocoons and moths all seemed to be finer in this country than in France, as if the soil and climate were more suitable; and all that was now required was machinery to wind the silk, which had not yet been done in this country, though it had in France and Italy. Dr. Wallace considered the experiment a great success, and thought the possibility of cultivating the silk-worm in this country was proved; ailanthiculture had one great advantage over the culture of the mulberry silk-worm, inasmuch as a crop of silk might be obtained from the Ailanthus tree in its third or fourth year, and in its tenth year it would be in full bearing, whereas it took from twenty to twenty-five years to establish a plantation of mulberry-trees. It might be roughly calculated that the trees might be planted at the rate of one to every square yard, and one tree would yield fifty cocoons; 1000 cocoons would produce 1 lb. of silk, which might be estimated to be worth £1 when spun: on the other hand, one boy could attend to an acre of silk-worms, and all the manipulation of the worms might be done by women and children of ten years old, so that the expenses would be trifling.

Mr. Scudder mentioned that in America use had been made of the larvæ of Bombyx Cynthia to make from the silken matter contained within them the fine lines by which fish-hooks were fastened. He also referred to the success of M. Trouvelot in cultivating the oak-feeding Bombyx Polyphemus (*vide ante*, p. 93), of which he had brought over some cocoons for M. Guérin-Méneville. M. Trouvelot had found the birds to be his greatest enemies.

Mr. W. W. Saunders said the Ailanthus would grow almost anywhere, and seemed to prefer a stiff soil; he had it growing on clay, and it had flowered, fruited and seeded. With reference to Prof. Westwood's statement, at the previous Meeting, as to the comparative density and tenacity of Ailanthus, oak and elm, he remarked that the qualities which made wood useful as timber were strength, elasticity and durability, and that Ailanthus was a poor and insignificant wood, and, like all quick-growing woods, would be useless as timber.

The Rev. Hamlet Clark drew attention to a letter signed "S. G. O." in 'The Times' of the 30th of September, on the subject of the prevailing disease amongst cattle, in which the author suggested a connexion between the extraordinary atmospheric condition of the present season and the cholera, rinderpest, and other epidemics which were rife. The following is an extract:—

"Some particular atmospheric action, acting *per se* or in combination with existing matters, whatever they may be, is at work pestilentially affecting animal life. If we had the same opportunities for observation, and an equal interest in using them, I have no doubt that we should find there is disease in the insect world, probably in all living creatures, or at least in very many classes of them. * * * * It is reasonable to

assume that any atmospheric condition which seriously affects one class of animal life shall more or less act on all such life. * * * * Able writers have propounded theories founded on the direct action of insect life as, under certain circumstances, likely to produce disease. * * * * It is quite true that the ova of certain insects may exist for years unhatched; that then, from some peculiar cause, they at once become living things, propagating with a rapidity almost beyond belief. * * * * I have long since arrived at the conclusion, that as the first bricks of the structure of all animals, all vegetation—the cells from which all alike commence—are, so far as Science has ascertained, not only similar in apparent structure, but can be affected in the same way by the same preparation,—that of cochineal used for microscopic investigation,—we have much of our life in common with all life around us. I do not believe there could be an ox-murrain, or pig or sheep disease, extensive sudden destruction of any one crop growing on a large scale, mortality or excessive vitality of any class of insect life, without some causes at work liable to produce disease in man and beast, herb, every creeping and flying thing, directly connected with life on our common soil. * * * * Corrupt animal or vegetable matters beget—I choose that term—vibrionic life, insect life, fungoid life; it is more than probable that this class of living products, or products ready to become alive, partake of the nature of that from which they are bred; it is, to me, quite possible they may require the same atmospheric action to give them active life that caused the death of the beast from which they proceed. * * * * I believe the principles which apply to men, with a certain subordination to the peculiar difference in some portions of the economy of life of animals, hold good. I am incredulous as to new diseases. When I am shown a man or beast of novel construction, I shall expect to hear of new complications in their organism—diseases of derangement of functions as new to us as the functions themselves. In cholera and in malignant typhus, we have morbid action and disorganization in excess—a destructive excess; in a less degree the animal economy shows the same morbid tendency under many other complaints."

Mr. Clark remarked that this theory, that the diseases affecting different classes of animal life were due to the same cause, namely, the atmospheric conditions to which those animals were exposed, seemed not improbable; and it would be interesting to know whether any unusual amount of death or disease, any absence of life, or rather any inferior vitality, in insects had been generally observed during the present season; the almost complete disappearance of wasps seemed to be a case in point.

Mr. J. J. Weir thought the year was remarkable for the abundance of insect life; and even as regarded wasps, he had, both at Tunbridge Wells and in Somersetshire, noticed a considerable (though not a large) number.

Dr. Alexander Wallace said that, as above mentioned, he had lost a number of his Ailanthus silk-worms by disease; it was during a period of three weeks in the wet month of August, when many of the larvæ were observed to delay their last change of skin, to become pale, then livid and sanious, and to fall to the ground; this was coincident with the prevalence of the potato disease. He had planted potatoes between the rows of Ailanthus trees and in some other interspaces, and when the disease first showed itself, the potato-stems were pulled up and laid in heaps: the caterpillars in the vicinity of the decomposing heaps died in greater numbers than those which fed at a greater distance; when fine weather returned the mortality among the worms ceased entirely. With respect to wasps, there had scarcely been a specimen visible at Col-

chester; plums and other fruit were rotting on the ground, and were consumed by earwigs, bees, &c., but not a single wasp.

The President remarked that swarms of black flies (an Aphis) were commonly regarded in France and Spain as precursors of cholera.

Prof. Westwood observed that, if wasps had been absent, all the common species of domestic flies had been unusually abundant, and so far from exhibiting any depressed vitality, had been excessively active and troublesome.

Papers read.

Mr. F. Walker communicated a paper entitled "Characters of a new Genus and Species of Chalcidites;" the insect in question was from Northern Australia, and bore a striking resemblance to some of the ant-tribe; it was described under the name of Myrmecopsis nigricans.

Mr. M'Lachlan read descriptions of some new British Trichoptera, supplementary to, and intended to be incorporated with, his Monograph of the British Caddis-flies.

Mr. M'Lachlan also read a paper entitled "Descriptions of new or little-known Genera and Species of Exotic Trichoptera; with Observations on certain Species described by Mr. F. Walker." The greater part of the species described were collected by Mr. A. R. Wallace in the Malayan Archipelago; others were from India, Australia and New Zealand. The new species were seventeen in number, the new genera nine.

New Part of 'Transactions.'

Trans. Ent. Soc., Third Series, Vol. ii. Part 5, being the fourth Part published during 1865, was on the table.

November 6, 1865.

F. P. Pascoe, Esq., President, in the Chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Philichthys xiphiæ, *Stp.*, monographisk fremstillet af V. Bergsoe;' presented by the Author. 'Nye Oplysninger om Philichthys xiphiæ, *Stp.*, af J. Steenstrup;' by the Author. 'Synopsis of the Bombycidæ of the United States,' by A. S. Packard, jun.; by the Author. 'Materials for a Monograph of the North-American Orthoptera,' by Samuel H. Scudder; by the Author. 'Reports on the noxious, beneficial and other Insects of the State of New York,' by Asa Fitch, M.D., Reports 3—9, 1859-65; by the Author. 'The British Hemiptera,' Vol. i. (Hemiptera-Heteroptera),' by J. W. Douglas and J. Scott; by J. W. Dunning. 'Memoires pour servir à l'Histoire Naturelle du Mexique, des Antilles, et des Etats-unis,' IVe Livraison (Orthoptères, Blattides); by the Author, Mons. H. de Saussure. 'Blattarum novarum Species aliquot, conscripsit H. de Saussure'; by the Author. 'The Zoologist' for November; by the Editor. 'The Entomologist,' No. 21; by the Editor.

The addition, by purchase, of the 129th livr. of Duval, Fairmaire et Migneaux, 'Genera des Coléoptères d'Europe,' was also announced.

Election of Members.

Samuel McCaul, Esq., B.C.L., of the Rectory House, London Bridge; and Henry Reeks, Esq., of the Manor House, Thruxton, were severally balloted for, and elected Members.

Exhibitions, &c.

Professor Westwood, on behalf of Mr. S. Stone, exhibited a specimen of Acherontia Atropos which had been born with only one antenna, the right-hand organ being entirely wanting; also the pupa-skin from which the moth had emerged, and which showed a rudimentary antenna, which, however, was not placed in its normal position along the side of the thorax, but projected out from the body and was then curved or thrown backwards, like the horn of a cow or ram.

Mr. F. Smith had a new locality to mention for Acherontia Atropos; a living specimen of the moth had been that day caught in the Reading Room at the British Museum.

Mr. Dunning mentioned the capture of a specimen of Chœrocampa Celerio on the 29th of September last, at Brantingham, near Brough, Yorkshire. It was taken in the net, shortly after 6 P.M., whilst hovering over a bed of Geranium. The captor was Mr. R. C. Kingston, the gentleman whose previous capture in 1846 of the same species in the same locality, but on the flower of Physianthus albicans, was recorded in the 'Zoologist' (Zool. 1863). Mr. Kingston described the flowers of the Physianthus as forming an excellent insect-trap; they were very sweet and attractive, and on the slightest touch to the stamens by the proboscis of an insect entering the nectary, the stamens and anthers closed firmly round and held the insect fast; he had seen the plant with dozens of insects upon it, amongst which Plusia Gamma was generally most abundant. Mr. Kingston also mentioned the abundance at Brantingham (as elsewhere during the present season) of Macroglossa Stellatarum, and of the larvæ of Acherontia Atropos; and on the 30th of September he had taken specimens of Cerastis spadicea on ivy-bloom.

Mr. M'Lachlan exhibited a female specimen of Sterrha sacraria captured near Worthing on the 19th of August last, and six specimens which had been reared by the Rev. J. Hellins from eggs laid by the aforesaid female on that day. Seven eggs were deposited, but one was crushed during transmission to Mr. Hellins; the remaining six all hatched on the 29th of August, the larvæ were fed on Polygonum aviculare, spun up between the 19th and 23rd of September, and were all in pupa by the 30th. The first moth, a female, emerged on the 15th of October, two more females on the 17th, a fourth female on the 19th, a male on the 25th, and lastly another male on the 28th of October. A full description of the egg, larva and pupa has been published by Mr. Hellins (Ent. Mo. Mag. ii. 134), and a coloured drawing by Mr. Buckler of several varieties of the larva was exhibited. Of the six moths thus bred not one was like its mother or bore any great resemblance to what has hitherto been considered to be the normal Sterrha sacraria; they differed also considerably from one another. Both the males had the upper wings suffused with an exquisite rosy tint, and the under wings, instead of being pure white, were clouded with fuscous; one female had the upper wings variegated with yellow and rose-colour, and the under wings yellowish; the remaining three females had the upper wings of a delicate buff, the oblique transverse stripe being blackish, and the cilia in one instance buff, in the others rosy, whilst the under wings were yellowish white. Any of these specimens, if caught at large,

might very pardonably have been described as a new species; and the amount of variation to which it now appeared that Sterrha sacraria was liable seemed to throw doubt upon the specific distinctness of the several continental forms which had been described as species allied to S. sacraria. In reply to enquiries, Mr. M'Lachlan stated that Polygonum aviculare was not previously known to be the natural food-plant, but had been given to the larvæ experimentally and was eaten with avidity. M. Carl Plotz had figured the larva on a species of Chamomile, but as the moth occurred in all parts it must either feed on some plant of very wide distribution or more probably was polyphagous.

Mr. Bond exhibited four specimens of Acidalia mancuniata, *Knaggs*, and for comparison therewith, a series of its nearest allies, A. subsericeata and A. straminata; also a coloured drawing, by Mr. Buckler, of the larva, which, as well as the imago, differed from those of the other species mentioned. This new insect had been both captured and bred at Manchester and Sheffield; in this case also the larvæ fed on Polygonum aviculare, a plant which appeared to be very generally acceptable to the larvæ of Geometræ.

Mr. Bond also exhibited a number of admirable photographs, by Dr. Maddox, of microscopic objects, *e.g.*, the leaf insect of the sycamore, the Acarus of the fig, parasites of the field-mouse, the mole, the sparrow, the chaffinch, &c.

Mr. M'Lachlan exhibited a partially andromorphous female of the dragon-fly, Calepteryx splendens; the left anterior wing was in colour precisely like that of a male, but retained the female form of wing; the right anterior wing had only blotches or dashes of the dark male colouring on the dorsal portion of the wing; the specimen was captured in France by M. Fallou, of Paris. De Selys Longchamps mentioned the capture, in Prussia, by Dr. Hagen, of a female C. splendens the wings of which were entirely coloured as in the male.

Mr. Janson exhibited Myrmedonia plicata, *Erich.*, a species new to Britain: a dozen specimens had been captured at Bournemouth in August last, by Messrs. E. A. and Edgar Smith; they were found on an open heath, at the roots of grass, amongst which was a nest of the ant, Tapinoma erratica. Mr. Janson remarked that the presence, in all the twelve specimens, of the curious conformation of the dorsal surface of the fourth and fifth abdominal segments rendered it probable that this structure was common to the two sexes, and was not peculiar to the male of Myrmedonia, as had hitherto been supposed.

Mr. G. R. Crotch exhibited Ægialia rufa, *Fabr.*, *Erich*, a species new to Britain, of which several specimens were taken at Liverpool by Mr. F. Archer, but, with the exception of that exhibited, had been accidentally destroyed; also Lithocharis castanea, *Grav.*, *Erich.*, which is the Medon Ruddii, *Steph.*, whilst the species from the Isle of Wight which is in many of our collections appears to be the L. maritima, *Aubé* (Grenier, Cat. Col. Fr.); also Monotoma 4-foveolata, *Aubé*, of which three or four specimens were formerly taken by Mr. Janson in Hainault Forest, and which was readily distinguished from all the other species by its thoracic foveæ; this name was introduced into the British list by Mr. Waterhouse, but afterwards withdrawn, his insect proving to be M. rufa, *Redt.*

Mr. S. Stevens exhibited a box of insects of all orders, being a further portion of the collection made by Mr. Andersson in Damara-land. Amongst them were Goliathus Layardi, Eurymorpha Mouffleti, *F.* (cyanipes, *Hope*), an Atractosomus, &c.; and a new species of Acræa from the Victoria Falls, Zambesi.

Mr. S. Stevens also exhibited a number of oak-spangles, the work of Cynips longipennis, which had recently been found in profusion by Mr. Hewitson at Oatlands.

Mr. S. Stevens announced the death of Mr. P. Bouchard at Santa Martha, whither he had gone to collect; and read a letter from Mr. Plant, dated Tamatavi, September 2, 1865, in which the writer recounted some of his entomological experiences in Madagascar.

The President called attention to the account published in that morning's newspapers of the wreck of the "Duncan Dunbar" on the reef Las Roccas, in long. 33° 45′ W., and lat. 3° 52′ S., on the 7th of October. The vessel struck the reef at high water, and became fixed upon the rock upon a small spot of which the passengers were landed. "On landing it was found that the little islet or bank of sand was covered with pig-weed, but there were no signs of water. . . . The island seemed quite covered with birds, which from their very wildness took no more notice of men or women than to move a few feet out of our way. The ground swarmed with a large species of earwig, and was in many places honeycombed by the holes of land-crabs." He was curious to know what pig-weed was, and whether the so-called earwigs were really Forficulæ: the reef was probably a recently-raised coral reef, and it would be very interesting to learn what were the first insect-forms which effected a settlement upon the newly-formed island.

The President read the following:—

Note on Calamobius and Hippopsis.—When M. James Thomson, in his 'Essai, &c.,' referred Stenidea to Blabinotus, he was immediately followed by Schaum, Grenier and de Marseul in their respective Catalogues. I directly called attention to that mistake, and it is now admitted. In his more recently published 'Systema Cerambycidarum,' M. Thomson refers Calamobius (*Guérin*) to Hippopsis (*Serville*), and in this I am surprised to see that he has been followed by M. Léon Fairmaire in the 'Genera des Coléoptères.' The two genera agree, it is true, in their slender habit, but they are perfectly distinct, and do not belong even to the same sub-family. Calamobius has 12-jointed antennæ, with antennary tubers non-approximate and nearly obsolete, small facets to the eyes, and small claw-joints; Hippopsis has 11-jointed antennæ, with well-developed tubers contiguous at the base and nearly erect, coarsely granulated eyes, and large claw-joints, as long as the three other joints of the tarsus taken together, whilst in Calamobius they scarcely form more than one-third of its length—a structure indicating different habits of life."

Mr. Hewitson communicated the following note:—

"It is interesting and worthy of notice that, in the second part of the Annals of the Entomological Society of France for this year, there is a figure of a variety of Chrysophanus virgaureæ from Zermatt, upwards of 5000 feet high in the Swiss Alps, which has a row of pale blue spots on the posterior wing, exactly resembling specimens of Chrysophanus Phlœas which we have lately received from the northern highlands of India. This variety of C. Phlœas is figured in Cramer, pl. 186, under the name of Timeus."

The Secretary announced the receipt of a communication from Mr. G. J. Bowles, Sec. Ent. Soc. of Canada, Quebec Branch, dated September 1, 1865, "On the occur-

rence of Pieris Rapæ in Canada." The principal part of it was an almost *verbatim* copy of a paper originally published in 'The Canadian Naturalist,' and thence transferred to the 'Zoologist' for 1864 (Zool. 9371). The following was new matter:—

"The species is rapidly extending the limits of its habitat. It is already common on both banks of the St. Lawrence for one hundred miles below Quebec; and this summer I saw two specimens in the cabinet of a gentleman in Montreal, captured this season in that city. It is still rare, however, in that locality. In the vicinity of Quebec the species was exceedingly abundant in 1863 and 1864, flying by hundreds over the fields and gardens, and was numerous even in the most crowded parts of the city. This year, however, it has not been quite so abundant, probably owing to the continued rains of August and September, 1864, which must have destroyed myriads of the larvæ, and the cold and backward spring of this year. Early in March, 1864, the butterflies began to appear in houses, produced from pupæ which had been suspended on the walls during the previous autumn. On the 6th of April—a time when the ground is still covered with snow, and the only Lepidoptera to be seen are a very few hybernating individuals of Grapta Comma or Vanessa Antiopa, lured from their winter retreats to enjoy the sunshine—several specimens were taken in the open air at Laval, about fifteen miles from Quebec. From that time the butterflies increased in number, and, continuing through the whole summer, might be seen even in October feebly fluttering over the gardens in the outskirts of the city. From the fact of there being no apparent diminution in their numbers during the season I infer that the insect is at least treble-brooded, or that there is a succession of broods, new individuals constantly emerging from the chrysalis to take the places of those that die off. The caterpillars reared by me last year passed through their stages very rapidly. When first taken, on the 8th of June, they were about a line long; on the 19th they pupated, and on the 26th of June the perfect insects appeared, making the whole period, almost from the egg to the perfect state, only eighteen days." In confirmation of his previous observation, that "living winter pupæ brought into the warm house from the cold outside invariably shrivelled and died in a few days," the author added, "I have not yet succeeded in procuring a butterfly from a chrysalis gathered on a winter day. It is thus evident that, although the species is increasing in numbers and spreading rapidly over a large extent of country, it is not yet fully acclimated."

Papers read.

The Secretary read a communication from Captain J. Mitchell, Superintendent of the Government Museum, Madras, entitled "Remarks on Captain Hutton's Paper on the Reversion and Restoration of the Silkworm" (published in the 'Transactions' for 1864). The author disputed the statement, that, in the formation of silk, the two fibres which emerge from the two small orifices in the lip are twisted together by certain hook-like processes in the mouth, and insisted that the two filaments are laid side by side in the cocoon, without twisting, and adhere together until separated by the solution of the gum in the process of manufacture. It was also pointed out that the Tussah silk, from Antheræa Paphia, is flat, and not cylindrical, each filament consisting of a large number of very fine fibres which are extremely difficult to separate; the finest fibres which the author had obtained from this compound filament measured about the 35-thousandth part of an inch in diameter. The filaments spun by Attacus Atlas and Actias Selene also appeared to be compound.

Mr. Hewitson communicated "Descriptions of New Hesperidæ," consisting of eighteen species of Pyrrhopyga and two of Erycides.

Mr. Baly read a paper entitled "New Genera and Species of Gallerucidæ," in which two new genera, Syphaxia and Chorina, and eleven species of Cerotoma (mostly from the Amazons) were described.

Mr. David Sharp communicated a paper "On the British species of Agathidium," enumerating eleven species, of which three new ones were described under the names of A. clypeatum, A. convexum and A. rhinoceras.

The Rev. D. C. Timins communicated some "Notes on collecting European Lepidoptera." After an exhortation to British Diurnal-Lepidopterists not to confine themselves to the narrow limits of their island, but to extend their range of study to the European forms, the author gave the results of his own collecting at Boulogne-sur-Mer, Pierrefonds in the Forest of Compiégne, in the neighbourhood of Paris, at Neufchâtel and Thun; and, finally, expressed his desire to supply information to students of European butterflies, either by indicating localities, recommending useful works, or furnishing specimens of species which he had met with in sufficient plenty.

New Part of 'Transactions.'

The 'Transactions of the Entomological Society,' Third Series, vol. v. Part 1, containing "Trichoptera Britannica; a Monograph of the British Species of Caddisflies," by Mr. R. M'Lachlan, and being the fifth Part published during 1865, was announced as ready for distribution.

Notice of Subjects for Discussion.

The President mentioned that the Council had been considering whether any and what steps were practicable in the way of giving notice beforehand of papers intended to be read or subjects introduced for discussion at the Meetings of the Society. If such notice could be given, members would come better prepared for the consideration of the question, and the interest and scientific value of the Meetings would be increased. A compulsory rule, that notice *must* be given, would stifle rather than promote discussion, if indeed it would not altogether exclude many subjects, which were, according to the present practice, incidentally discussed on the exhibition of some specimen or object of interest, and which exhibition it was that suggested and gave rise to the discussion. These incidental conversations, when confined within proper and reasonable limits, formed one of the most valuable and interesting features of the Meetings, and it was impossible to require previous notice of these, since Members themselves often might not know until the very day of Meeting whether they would be able to attend, or if so what insects they would have to exhibit. All that the Council could hope for, and what he had been desired by the Council to request, was that, in future, when any member intended to read a paper on or otherwise bring forward any subject of general interest at a particular Meeting, he would announce the subject at the previous Meeting, if possible, or subsequently at the earliest period to the Secretary, who would give such publicity or notice as under the circumstances might be practicable.

December 4, 1865.

F. P. Pascoe, Esq., President, in the Chair.

Donations to the Library.

The following donations were announced, and thanks voted to the donors:—'Memoires de la Société de Physique et d'Histoire Naturelle de Genève,' Tome XVIII, 1e Partie; presented by the Society. 'Bulletin de la Société Impériale des Naturalistes de Moscou,'—1864, Nos. 2, 3 and 4,—1865, No. 1; by the Society. 'Tijdschrift voor Entomologie,' Vol. VIII, Parts 1—4; by the Entomological Society of the Netherlands. 'Annales de la Société Entomologique de France,' 1864, 4e trim.; by the Society. 'Stettiner Entomologische Zeitung,' 1865, Nos. 4—6, and Nos. 10—12; by the Entomological Society of Stettin. 'The Journal of Entomology,' No. 13; by the Proprietors. 'Synopsis of the Bombycidæ of the United States,' Part 2, by A. S. Packard, jun.; by the Author. 'The Zoologist' for December; by the Editor. 'The Entomologist's Monthly Magazine' for December; by the Editors.

Election of Members.

The Rev. W. Farren White, Stonehouse Vicarage, Gloucestershire; and John Henry Hartwright, Esq., Terrace, Kennington Park, were severally balloted for, and elected Members.

Exhibitions, &c.

The Secretary exhibited a collection of Lepidoptera, Coleoptera and Hymenoptera, made at Moulmein and in the Salween Valley, British Burmah, in July and August, 1865, by Lieut. R. C. Beavan. Amongst the Coleoptera, Mr. Baly detected a new species of Prioptera.

Mr. S. Stevens exhibited a box of admirably-preserved Lepidoptera from Santa Marta, part of the collection of the late Mr. Bouchard; and a specimen of Goliathus giganteus captured by Mr. Du Chaillu about 100 miles inland from Fernand-Vaz, and thence brought home in his pocket, being the only insect which he was able to carry away with him on his recent hasty retreat from the interior of Western Africa.

Mr. Stainton exhibited a remarkable variety of Tinea cloacella, bred by Mr. C. S. Gregson, from dead birch trees at Llangollen; the moth was entirely suffused with a dark ruddy brown (almost coppery) colour.

Mr. F. Smith exhibited a series of bred specimens of the Tenthredinidous insect, Crœsus septentrionalis; he had found the larvæ nearly full-fed on the 20th of August last; in four or five days they buried themselves, and within a month the perfect flies emerged, much to his surprise, as he had not expected them to hatch until next spring.

Mr. McLachlan believed the fly to be double-brooded; he had captured it at Rannoch in June last.

Mr. F. Smith (on behalf of Dr. J. E. Gray) exhibited specimens of a greasy-looking Noctua, known as the "Bugong" moth (probably the Agrotis spina, *Guenée*), sent from Australia by Dr. George Bennett, and read the following extract from that gentleman's 'Wanderings in New South Wales' (vol. i. p. 265):—

"Near this station [in the Murrumbidgee District] is a lofty table-mountain. It is named Bugong Mountain, from the circumstance of multitudes of small moths, called Bugong by the aborigines, congregating at certain months of the year about masses of granite, on this and other parts of the range. The months of November, December and January are quite a season of festivity among the native blacks, who assemble from far and near to collect the Bugong: the bodies of these insects contain a quantity of oil, and they are sought after as luscious and fattening food. I felt very desirous of investigating the places where these insects were said to congregate in such incredible quantities, and availed myself of the earliest opportunity to do so. After riding over the lower ranges we arrived a short distance above the base of the Bugong Mountain. This was the place where, upon the smooth sides or crevices of the granite blocks, the Bugong moths congregated in such incredible multitudes; but from the blacks having recently been here we found but few of the insects remaining. From the result of my observations it appears that the insects are only found in such multitudes on isolated and peculiar masses of granite: for what purpose they thus collect together is not a less curious than interesting subject of inquiry. Captain Cook mentions that at Thirsty Sound he found an incredible number of butterflies, so that for the space of three or four acres the air was crowded with them; that millions were to be seen in every direction. The Bugong is doubtless the same species as that observed by Captain Cook. The Bugong moths are found on the surfaces of the masses of granite, and to procure them with greater facility the natives make smothered fires underneath those rocks about which they are collected, and suffocate them with smoke, at the same time sweeping them off in bushels-full at a time. A circular space is cleared upon the ground, and on it a fire is lighted, and kept burning until the ground is considered to be sufficiently heated, when, the fire being removed and the ashes cleared away, the moths are placed thereon, and stirred about until the down and wings are removed from them; they are then placed on pieces of bark, and winnowed to separate the dust and wings; they are then pounded into masses or cakes, resembling lumps of fat, and may be compared in colour and consistence to dough made from smutty wheat mixed with fat: the masses will not keep good above a week unless smoked, when they will keep a much longer period: the taste is that of a sweet nut."

The President referred to the account given by Dr. Livingstone, in his African travels, of midges being made into cakes.

Mr. F. Smith said that a correspondent of his had recently inquired of him whether there was any truth in the statement that the soft-bodied little Atropos pulsatorium makes a tapping noise like that attributed to Anobium; and the same correspondent also expressed his doubt as to Anobium making a tapping noise. On the latter point, in spite of the oft-repeated and commonly received statement that the "death-watch" makes a distinct tapping against (say) an old wainscot and on the outside of it, as if for the purpose of notifying his presence to the female within, he (Mr. Smith) shared the doubt of his correspondent, and believed that the only noise made by the Anobium was caused by its gnawing the wood internally, and that there was no external tapping at all. He had himself met with instances in which the internal gnawing of wood by insects was distinctly audible, and, in particular, he mentioned the case of a rustic garden-seat from which proceeded a noise like many watches simultaneously ticking, and which was solely caused by xylophagous insects.

Several Members said that, as they understood the popular account of the Anobium, the tapping was not represented as being external; it was the fact of the noise being heard, whilst nothing was visible which could be suggested as producing it, that caused the ignorant to dread the so-called death-watch.

The Rev. J. Greene exhibited eight moths bred by him from pupæ which had been sent to him by Mr. Batty, of Sheffield, as pupæ of Acidalia subsericeata: from these had emerged one moth which was undoubtedly A. subsericeata, one which did not agree with any species known to him, and six which were clearly referable to the recently-described A. mancuniata of Dr. Knaggs.

Mr. F. Moore produced for inspection a series of well-executed plates of the insects of N. America, engraved by Mr. Townend Glover, of the State Department of Agriculture: these plates were a portion only of an extensive series which Mr. Glover has in preparation for his forthcoming work on the Insects of North America, and are illustrative, in the different Orders, of many of the species in their various stages of transformation; accompanying them was also a series of plates illustrating the insects destructive to the cotton plants, orange and lime trees, potato, &c., in America. Mr. Glover has been officially engaged for some years past in the study of the insects injurious to vegetation in America, and the results of some of his labours have been published in recent volumes of the American Patent Office (Agricultural) Reports.

Mr. Jenson also produced twenty-four plates of the same series, illustrative of the Coleoptera of North America.

Mr. C. A. Wilson, of Adelaide, communicated another instalment of his "Notes on the Buprestidæ of South Australia."

Prof. Westwood exhibited three new Longicorn beetles, for which he proposed the names of Cantharocnemis Livingstonii (from Zambesi), Cantharoctenus Burchellii (from Damara-land), and Cantharoplatys Felderi (from the White Nile). The two latter were clearly allied to Cantharocnemis, but differed therefrom and from one another; he therefore proposed for them different sub-generic names, but in so doing had endeavoured, by the form of name selected, to show their subordination to or dependence upon the primary genus Cantharocnemis.

The President was unable to see the advantage of giving distinct names to subdivisions which were admittedly not genera. In the present case, by what name was the insect to be known? Cantharocnemis Felderi? or Cantharoplatys Felderi? or Cantharocnemis (Cantharoplatys) Felderi? If by the first, why introduce the name Cantharoplatys at all? If by the second—then, either Cantharoplatys is in fact treated as a genus whilst it is confessedly not of generic value, or the fundamental rule of the binomial nomenclature, that an insect is known by the names of the genus and species to which it belongs, is infringed. If by the third, the binomial nomenclature is abrogated, and a trinomial system introduced, without any advantage to compensate for its greater cumbrousness and difficulty of retention in the memory. If a newly-discovered form differed so much from previously-known forms as to be incapable of admission into any established genus, it must of course be described as a new genus and under a new name; but in his opinion there was not any subordinate or intermediate stage between the species and the genus to which it was either necessary or desirable that a distinct name should be applied.

Mr. Stainton thought that, in the state at which Natural History had arrived, and owing to the immense variety of forms which had been and would doubtless continue

to be discovered, there was only a choice of difficulties from which he saw no escape: on the one hand, if comparatively small differences were for generic purposes disregarded, the genera became unmanageable in extent and incapable of precise description; on the other hand, if such differences were taken into account, there was no limit to the creation of genera; almost every species would eventually be raised to generic rank, or rather the genus would sink to the level of the species, and in fact be lost as a distinct step in the ladder of classification.

Papers read.

Mr. Geo. Semper, of Altona, communicated a paper entitled "Description of Papilio Godeffroyi, n. sp."

Mr. R. McLachlan read a paper entitled "Observations on some remarkable Varieties of Sterrha Sacraria, *Linn.*; with general notes on Variation in Lepidoptera."

January 1, 1866.

F. P. Pascoe, Esq., President, in the Chair.

Additions to the Library.

The following donations were announced, and thanks voted to the donors:—'Proceedings of the Royal Society,' Vol. xiv. No. 78; presented by the Society. 'Journal of the Proceedings of the Linnean Society,' Vol. viii. Zoology, Nos. 31 & 32; by the Society. 'Bulletin de la Société Impériale des Naturalistes de Moscou,' 1865, No. 2; by the Society. 'Verzeichniss der um St. Petersburg aufgefundenen Crabroninen,' von August Morawitz; by the Author. 'Ueber eine neue, oder vielmehr verkannte Form von Männchen unter den Mutillen, nebst einer Uebersicht der in Europa beobachteten Arten,' von August Morawitz; by the Author. 'Enumeratio Animalium Musei Imperialis Academiæ Scientiarum Petropolitanæ,' Lepidoptera, Parts i.—iii., by E. Ménétriés; presented by A. Morawitz, Esq. 'Coleoptera Atlantidum, being an enumeration of the Coleopterous Insects of the Madeiras, Salvages and Canaries,' by T. Vernon Wollaston, M.A., F.L.S.; by the Author. 'Sepp, Nederlandsche Insecten,' 2nd Ser. Vol. i. Nos. 47—50; Vol. ii. Nos. 1—8; by S. C. Snellen van Vollenhoven, Esq. 'The Zoologist' for January; by the Editor. 'The Entomologist's Monthly Magazine' for January; by the Editors.

The addition, by purchase, of the following was also announced:—'Skandinaviens Coleoptera,' af C. G. Thomson, Tom. vii. Häftet ii; Duval, Fairmaire et Migneaux, 'Genera des Coléoptères d'Europe,' Livr. 130.

Election of Members.

Henry Adams, Esq., F.L.S., Captain Julian C. Hobson, C. O. Rogers, Esq., and Dr. E. Perceval Wright, were severally ballotted for and elected Members. Thomas Blackburn, Esq., and W. B. Pryer, Esq., were severally ballotted for and elected Annual Subscribers.

Exhibitions, &c.

Mr. S. Stevens exhibited four large cases of Lepidoptera and Coleoptera from the Himalayas, containing numerous rare species, and many of the Lepidoptera having been bred from the larvæ.

Mr. Bates gave an account of Mr. Bartlett's explorations in the Amazons country; he had gone up the Amazons River as far as Nauta, and had thence followed the course of the Ucayli until he reached the eastern slopes of the Cordilleras: a collection of objects of Natural History, including several thousand insects, the result of four months' labour, had been despatched, and might shortly be expected in England. Whilst speaking of the Amazons, Mr. Bates desired to mention that the local authorities at Pará, which was merely the chief town of a province of Brazil, had recently voted £600 towards the expenses of scientific researches undertaken by Agassiz.

Prof. Westwood read extracts from a letter from M. Snellen van Vollenhoven, recounting some of his entomological experiences during the past season.

A conversation ensued respecting the female Lepidoptera which occur in autumn with undeveloped ovaries. Mr. J. Jenner Weir inquired whether such females, after hybernation, were found to have developed ovaries in the spring? It might be that early hybernation was an aid to the development of the ovaries. Prof. Westwood thought it probable that the ovaries were developed during the winter; the difficulty was to say when the impregnation took place; this, in the case of wasps, must be in the autumn, since the males did not survive the winter. Mr. M'Lachlan observed that nearly all the hybernated specimens of Vanessa were females; but he had himself taken Cerastis Vaccinii and C. spadicea respectively *in copulâ* on sallow-blossoms in the spring.

The following are descriptions of the three new exotic Longicorn beetles exhibited by Prof. Westwood at the previous Meeting:—

Cantharocnemis Livingstonii, *Westw.*

C. picco-niger; mandibulis subfalcatis, intus ante medium dente conico parvo armatis, apicibus oblique truncato-emarginatis; antennis subcrassis, capitis (cum mandibulis) et pronoti longitudine; capitis disco ruguloso, postice lævi, punctato; pronoti marginibus lateralibus subserratis, lateribus rude punctatis, disco sublævi nitido, tenuissime punctato, angulis posticis oblique emarginatis; elytris subrugulosis, punctatis, et singulis costis 5 parùm elevatis sed sat distinctis notatis; tibiis anticis extus 4- vel 5-denticulatis, denteque forti subapicali armatis, 4 posticis intus dense fulvo hirsutis.

Long. corp. lin. 15½; mandib. lin. 2½.

C. Spondyloide tertia parte major, magis nitidus et depressus, denticulis tibiarum anticarum minoribus.

Habitat Zambesi. Dom. rev. H. Rowleio captus. In Mus. Hopeiano Oxoniæ.

Sub-genus novum Cantharoplatys, *Westw.*

A genere *Cantharocnemide* differt corpore magis depresso, mandibulis multo crassioribus et dente subbasali armatis, antennis abbreviatis, elytris cicatricosis (nec punctatis), juguli angulis lateralibus valde prominentibus.

Cantharoplatys Felderi, *Westw.*

C. piceo-niger, subopacus; mandibulis subtrigono-falcatis, dente valido intus prope basin armatis; antennis latitudinem capitis longitudine vix superantibus; capite et pronoto punctatissimis, hujus disco magis lævi et subirregulari, utrinque circulariter subimpresso; capitis vertice longitudinaliter canaliculato; pronoto transverso, postice latiori, angulis posticis fere rectangulariter incisis; elytris minute cicatricosis, punctisque minutis inter cicatrices dispositis, costis 3 longitudinalibus ordinariis vix distinctis; tibiis anticis extus in medio 2- vel 3-denticulatis, apice dente lato armatis, 4 posticis extus denticulatis; femoribus subtus castaneis; metasterno fulvo velutino sericante, disco crebre punctatissimo.

Long. corp. lin. 17; mandib. lin. 2.

Habitat in Africa, apud fluv. "White Nile." Dom. Feldero captus, et nomine ejus honorato inscriptus.

Sub-genus novum Cantharoctenus, *Westw.*

Cantharocnemidi proximum; differt prothorace magis cylindrico, antennis duplo longioribus, 18-articulatis, articulis duplo pectinatis, pedibusque longioribus.

Cantharoctenus Burchellii, *Westw.*

C. piceo-castaneus, nitidus; prothorace cylindrico; mandibulis capitis longitudine, falcatis, apice valde oblique truncatis, dente acuto apicali, altero subapicali interno, basi etiam intus dente parvo conico nigro armatis; antennarum articulis omnibus (2 basalibus exceptis) infrà ad basin dentibus 2 armatis, apice infrà in lobum latum tenuem deflexum producto, cujus margo incisus dentes 2 alios simulat (inde antennæ singulæ 64 spinas habere videntur); capitis vertice in medio canali longitudinali tenui instructo; prothorace nitido, angulis anticis rotundatis, posticis oblique truncatis, lateribus pone medium spina parva armatis, disco nitido, utrinque pone medium tuberculo parum eminente subnotato; elytris prothorace multo latioribus, nitidis, punctatissimis, sutura striolisque 2 longitudinalibus lævibus vix distinctis notatis; metathorace subtus fulvo dense hirto; tibiis anticis planis, extus in medium spinis 2 denticulisque nonnullis minutis armatis, apiceque extus in spinam latam producto, 4 posticis extus denticulatis.

Long. corp. lin. 13; mandib. lin. 2.

Habitat "Damara Land" Africæ merid. Dom. Andersson captus. In Mus. Hopeiano Oxoniæ.

Papers read.

Mr. W. C. Hewitson communicated a further instalment of his "Descriptions of new Hesperidæ," including twenty-three species of the genus Hesperia.

The President read a paper entitled "A List of the Longicornia collected by the late Mr. P. Bouchard at Santa Marta." The species were upwards of fifty in number, and four new genera were characterized.

ANNUAL MEETING.

January 22, 1866.

F. P. Pascoe, Esq., President, in the chair.

An Abstract of the Treasurer's Accounts for 1865 was read by Mr. Wilkinson, one of the Auditors, and showed a balance in favour of the Society of £78 11*s.* 10*d.*

The Secretary read the following:—

Report of the Council for 1865.

"In compliance with the Bye-Laws, the Council begs to present the following Report:—

"The loss of two of our Honorary Members will be regretted by all entomologists. Léon Dufour has been gathered to his fathers at a ripe and patriarchal age; Science can but deplore the too early death of Hermann Rudolph Schaum.

"The recent increase in our numbers is a subject of warm congratulation. It is true that the changes which time inevitably works have deprived us of the aid of fifteen of our former supporters; on the other hand we have, since the last Anniversary, elected forty-one Members and eighteen Annual Subscribers: the result is a clear addition of forty-four to the number of our Contributors.

"The Council has revived a practice which had for some years fallen into disuse, of offering Prizes for Essays of sufficient merit on Economic Entomology. Three competitors have entered the lists, and the result of the competition will be to-night announced by the President.

"The 'Transactions' of the Society maintain their scientific value. The thanks of the Council are offered to those gentlemen whose liberality has provided or assisted in providing the expense of many of the Plates illustrative of the various Memoirs. The publications for 1864 were unprecedentedly extensive; they are exceeded by one-sixth by the five Parts of 'Transactions' issued for 1865. The Council desires in particular to call attention to the *Trichoptera Britannica*, in the first place as rendering accessible to students an Order of Insects to which little attention has hitherto been paid, and in the second place as being a praiseworthy addition to the entomological literature of our own country. Whilst desiring to assist in the advance of Entomology in its most general and catholic sense, and whilst repudiating all mere local prejudice, or intention of limiting our range to the narrow bounds of these islands, the Council is anxious to keep in view that primary duty which Nature imposes upon us as British Entomologists, namely, the cultivation of British Entomology. As regards the past, the fact that so little has recently appeared on British insects cannot be charged as a fault against the Executive of the Society, which has published every paper that has been offered to it; as regards the future, the Council declares emphatically that contributions to the knowledge of British Insects will always be received with welcome.

"The financial state of the Society may be summarized as follows:—

Receipts.	£	Payments.	£
Members' Contributions	253	Rent, Librarian's Salary, and General Management ...	97
Sale of 'Transactions'	76	Library	15
Interest on Consols	3	Publications	225
Tea Subscriptions	9		
	£341		£337

"Thus the actual income has exceeded the actual expenditure by £4; and comparing the 1st of January, 1866, with the 1st of January, 1865, we have this result:—

	1865.	1866.
Cash Balance in hand.....	£7 4*s.* 5*d.* ...	£11 14*s.* 10*d.*
Excess of Assets over Liabilities...	£71 11*s.* 11*d.* ...	£78 11*s.* 10*d.*

"Thus the number of recruits has enabled the Council to meet the large expenses of the year without resort to extraneous aid, and without diminishing the resources of the Society; and the year 1866 opens with an increase to our productive strength of forty-four member power.

"In fine, the Council hands down to the care of its successors, whom it is now your office to appoint, the direction of a Society which it is pleased to think is both increasingly useful and increasingly appreciated.

"January 22, 1866."

The following gentlemen were elected to form the Council for 1866 (namely):—Messrs. Bates, Dunning, Sir John Lubbock, McLachlan, Moore, Pascoe, W. W. Saunders, Edwin Shepherd, A. F. Sheppard, S. Stevens, Alfred R. Wallace, J. J. Weir, and Prof. Westwood.

The following Officers for 1866 were afterwards elected (namely):—President, Sir John Lubbock, Bart., F.R.S., &c.; Treasurer, Mr. S. Stevens; Secretaries, Messrs. Edwin Shepherd and Dunning; Librarian, Mr. Janson.

The President announced that one of the Prizes offered for Essays of sufficient merit on Economic Entomology had been awarded to Alexander Wallace, Esq., M.D., M.R.C.P., of Beverley House, Colchester, for his Memoir "On Ailanthiculture."

The President then read the following Address:—

THE PRESIDENT'S ADDRESS.

GENTLEMEN,

The "Annual Report of the Council on the general concerns of the Society" having been laid before you in accordance with our bye-laws, I shall confine the few remarks I have to make chiefly to the progress of Entomology during the past year.

I must, however, congratulate you on the accession of fifty-nine new Members since our last Anniversary, and I think I may say that never were the prospects of the Society better, or the energy of its Members more apparent.

Let us also take a glance at the career of one or two of those who have gone from among us; for we have lost, by death, two of our Honorary, three of our Ordinary, and one of our Corresponding Members.

Few Entomologists have enjoyed a higher reputation than Prof. Dr. Schaum, of Berlin. Born at Glogau in 1819, the nephew of Germar at an early age exhibited a liking for our Science, and his inaugural dissertation at the University of Halle ('Analecta Entomologica,' published in 1841) treated of Scydmænus, Cremastocheilus and Cetonia. From that time down to his death his pen was never idle; his numerous contributions to Germar's Zeitschrift, the Stettin Ent. Zeit., the Berlin Ent. Zeitsch., the Ann. Soc. Ent. Fr., the Transactions of this Society, and many other scientific publications, are sufficient evidence of his activity. His Catalogue of the Coleoptera of Europe is too well known to require mention at my hands; the Hemiptera and Orthoptera of Peters' 'Reise nach Mossambique' were the work of our late colleague; but undoubtedly his greatest undertaking was the continuation of Erichson's 'Naturgeschichte der Insecten Deutschlands,' to which he contributed the Geodephaga.

Dr. Léon Dufour devoted himself chiefly to the study of the anatomy and metamorphoses of insects; his numerous papers on these and kindred subjects extend over a period of more than half a century.

Born at St. Sever (Landes) in 1780, he lived to the age of 85, and died in his native town. Almost simultaneously with his election as one of our Honorary Members, he was in 1860 chosen Honorary President of the Entomological Society of France, a position corresponding with that formerly filled in this Society by our own still-more-venerable Kirby.

Sir Robert Herman Schomburgk was first brought into notice at the Geographical Society by his exploration of Anegada, one of the Virgin Islands; he afterwards explored the rivers Essequibo, Corentyn, and Berbice. For his researches, by which Zoology and Botany were much enriched, and during which he sent home the Euryale Amazonica, now known as the Victoria regia, he obtained the gold medal of the Geographical Society in 1840. In 1843 he investigated British Guiana, and for his services received the honour of Knighthood. In the latter years of his life he resided at Bangkok, as Her Majesty's Consul-General in the Kingdom of Siam. He returned to this country in the autumn of 1864, but died at Berlin on the 11th of March, 1865.

General Sir John Bennett Hearsey, K.C.B., was a cornet in 1808; he was present at the battle of Seetabuldie and at the siege and capture of Bhurtpore; in the Punjaub campaign of 1848—49 he was at Chilianwallah and Goojerat, and commanded the cavalry in the pursuit and at the final surrender of the Sikh army. He was several times wounded, and was made a K.C.B. for his services in the great mutiny of 1857. At that time he was in command of the Bengal division, with his head-quarters at Barrackpore. Speaking of a chief of long standing in the service, "who to the cost of humanity was in charge of Meerut on that (first) day of evil omen," the Competition Wallah says, "Such a chief was *not* in charge of Barrackpore at the crisis when foresight, calmness and judicious severity broke up a battalion of murderous scoundrels, and saved the capital of India from the fate of Cawnpore. Hearsey at Meerut, Neill at Dinapore, and Outram at Allahabad, might have saved much of the good blood that was spilled, and much of the bad blood that remained."* General Hearsey served fifty-three years in India, thirty-four of them without a furlough. He was a most zealous collector, and an untiring observer. It was to him and other officers in India that Prof. Westwood was indebted for the materials of that splendid work 'The

* 'Macmillan's Magazine,' viii. p. 343.

Cabinet of Oriental Entomology.' He died in October last, having been for nearly twenty years a Member of our Society.

The death in early manhood of Mr. F. A. Jesse, who was also a Fellow of the Linnean, Zoological and Geological Societies, and not without hereditary claim to the regard of naturalists, has prevented the fulfilment of the hopes inspired by his ability and scientific tastes.

Of the recent loss of M. Achille Deyrolle we must all have heard with regret; he was only fifty-two years of age. His 'Guide du jeune Amateur de Coléoptères et de Lépidoptères' (1847, anon.); two papers 'Sur des Carabiques trouvés en Brésil' and 'Note pour servir à l'histoire des Carabes d'Espagne et du Portugal,' in the Ann. Soc. Ent. France, 1847 and 1852; and the Coleoptera in the Abbé Maillard's 'Notes sur l'Ile de la Réunion,' are the only works of his with which I am acquainted. But though he published little, there can be no doubt that, by his influence and exertions, and particularly by the facilities he afforded to Entomologists in their pursuit, he contributed materially to the progress of our Science.

Perhaps I ought not to omit some notice of the late William Sharp MacLeay, as one who was once a Member of our Society, and whose work, entitled 'Horæ Entomologicæ,' has quite recently been pronounced to contain "some of the most important speculations, as to the affinities or relations of various groups of animals to each other, ever offered to the world, and of which it is impossible to overrate the suggestive value." Born in London in 1792, he was in 1815 appointed to a diplomatic post in Paris, where he was thought to have acquired his taste for Philosophical Zoology from the society of such men as Cuvier, Geoffroy St. Hilaire and Latreille. In 1825 he was sent to fill a higher office at the Havannah, and, after ten years' residence there, retired from the public service. In 1839 he settled in Australia, and continued to reside near Sydney until his death, at the age of 72. His collections, especially of Australian insects, are understood to be very large and valuable, and will, no doubt, be turned to good account by his nephew, Wm. MacLeay, Esq., F.L.S., M.L.A., &c., into whose possession they have passed.

I would now call your attention to the remarkable observations of Prof. Wagner, of Kasan, respecting the larvæ-producing larvæ of the Dipterous fly, Miastor metraloas. In this country they have attracted very little attention, but abroad they have been received with incredulity, and his statement declared to be "a pure and simple delusion."

They have, however, been amply confirmed by Meinert, Von Siebold,* Pagenstecher, Ganine,† and others. In examining certain larvæ Wagner saw "new larvæ crawling out of them," and these, in from seven to ten days, brought forth other new larvæ, and some of them went on multiplying in this way throughout the winter. These larvæ seemed to him to have been developed from "embryonal bodies" belonging to and arising from alterations in the organism. M. Pagenstecher, however, differs from this view of their origin, and M. Ganine, of Karkow, who has closely studied the reproductive organs, describes them as two little sacs, placed in the eleventh segment of the body, in which are developed the germs or pseudo-ova. This statement is, in the main, confirmed by Dr. R. Leuckart,‡ who affirms that this mode of propagation is general among the Cecidomyinæ, the sub-family to which the Miastor belongs.

The notion that all insects pass through three definite stages after their extrusion from the egg is so general that, notwithstanding several well-known exceptions to the contrary, there are few Entomologists who will not feel astonished at the statement of Sir John Lubbock, that Chloëon,§ one of the Ephemeridæ, only attains its perfect state after "a series of twenty moultings." In point of fact there is no metamorphosis, but a gradual development—not of all the organs, however, with the same degree of rapidity—up to one of the later stages, when a kind of retrograde movement takes place. That in the earlier stages of these insects no tracheæ are present, is one of those facts that should teach us how uncertain it is to assume anything from analogy. It is an exception; the only one, it is believed, yet known.

It will be recollected that our Society has been occupied on two or three occasions with discussions in regard to Mr. Walsh's conclusions respecting the dimorphism of certain gall-flies. Mr. Walsh's hypothesis rests entirely on the identity of the galls, and this has been

* See 'Zeitschrift für Zoologie,' 1865, p. 106 *et seq.*, for an account of Wagner's discovery, and Von Siebold's remarks thereon.

† For various statements relative to the organization, &c., see Ann. des Sciences Nat. 1865, pp. 259—291.

‡ Wiegmann's Archiv, &c., 1865, p. 286 *et seq.*

§ Trans. Linn. Soc. xxiv. p. 61 (1863). The completion of this remarkable paper has only recently been read to the Linnean Society, and the latter part of the above paragraph is given from memory.

questioned by M. Reinhard, of Bautzen,* who says the galls of various species appear to be so transitional between other forms, that they can only be known with certainty when the insect appears. Cynips spongifica, produced from the summer gall, is considered by Reinhard to be generically distinct from Cynips aciculata, produced from the winter gall. To this new genus he gives the name of "Amphibolips." It is suggested that the former may either be an inquiline of C. aciculata, or that they simply agree in making similar galls.

Among the most generally interesting of entomological works are the 'Reports on the Noxious, Beneficial and other Insects of the State of New York,' by Dr. Asa Fitch. The sixth, seventh, eighth and ninth have now been published at Albany, and, besides the descriptions of several new species, life-histories, and the histories of their doings good and bad, the latter unfortunately predominating, they abound in highly-important information relative to the ravages of insects and their remedies. Of the yellow-legged barley-fly (*Eurytoma flavipes*), for instance, we learn that its depredations have been so great in the central part of the State, that, unless some relief is found, "barley will hardly appear in our census reports." It is worth remarking, by the way, that the New York farmers appear from this to have no objection to making returns of the yield of *their* crops. In 1862 Crioceris asparagi made its appearance on Long Island, and it would seem that the injury done in the same year was so great as to threaten "the total destruction" of the Asparagus, a most important crop in that State, one little district alone—Oyster Bay—selling 20,000 dollars' worth annually. Fortunately it was very soon discovered that the skunk (*Mephitis americana*) had a relish for these insects, and this suggested the idea that they might prove as acceptable to other animals less intolerable to man. Fowls were accordingly tried, and with the best results; nor are the plants found to be injured by their presence. One more notice: a new enemy to the bee has made its appearance in the Nebraska territory, the Trypanæa apivora (Asilidæ). Although one of the same family—perhaps more than one—is known to attack the bee in Europe, it is only occasionally; but in this case it seems that in the season of 1864 no swarm had been thrown off (at least up to the time of the report), and this was attributed to the destruction caused by the "bee-killer," as it has been termed.

* Berliner Entom. Zeitschrift, 1865, pp. 1—13. For a full report of this valuable paper see Quart. Journ. of Science, ii. p. 670.

The long-expected volume of the Ray Society, on the British Hemiptera-Heteroptera, by Messrs. Douglas and Scott, was published last summer. I must confess that my expectations of the work have been disappointed. The plates by Mr. Robinson are exquisite, and evidently great care has been taken by the authors of the descriptions; but the book is all descriptions; throughout there is no attempt to differentiate either the genera or the species, * or to throw one ray of light on their affinities or distribution. "Commencing with the head and finishing with the abdomen," as M. Guérin-Méneville observed on another occasion, "is a very easy way of getting on, and reduces the task to a merely mechanical operation, for it is only necessary to put down all you see of an insect to describe it, and then leave to the poor reader the care and trouble of picking out all that seems good to him." We should have been glad to know why some names are exchanged for others of later date, or, in many cases, of the authors' own creation; and we would especially complain that all names not adopted by the authors have been omitted from the index. Messrs. Douglas and Scott, following Fieber, have distributed our comparatively few British species into a number of little groups, sixty-four altogether, which they call families.

A little work, entitled 'The Animal Creation: a Popular Introduction to Zoology,' by Professor Rymer Jones, has been published by the Society for Promoting Christian Knowledge. As the books of that Society are largely circulated, I deeply regret that the entomological part was not written by one who had more acquaintance with the subject. For instance, the weevils are referred to "Bruchus," the diamond beetles only coming under "Curculio;" the "long-horned beetle (Prionus)" is given as an example of the "Xylophagi," and this is illustrated by a poor wood-cut figure of the well-known stag's-horn (*Macrodontia cervicornis*); an Anobium represents Ptinus, and so on. The work, if such mistakes had been avoided, would nevertheless have been considerably below the present state of Science, even as a popular publication.

The appearance of 'The Zoological Record' is a new feature in our literature. Nearly half the volume is devoted to Insects, and this part is written by Mr. Dallas with that exhaustive care which leaves little to be desired. The want of an Index, however, is to be

* Except such phrases as "longish oval, stout," for one genus, "elongate oval, broad," for the next, or "oval" for the third, occupying the line directly under each genus; or, under the species, "cinnamon-brown," to contrast with "brown-yellow," &c.

regretted. It is intended to publish a similar 'Record' annually, and it will be a misfortune to Zoologists if such a work should fail for want of adequate support.

In particularly calling your attention to the "Entomological Society of New South Wales," I cannot but congratulate its Members on the position which their Society has taken, and the interest with which we look forward to their 'Transactions.' Two Parts have appeared during the year. In the first (Part 3) there is a paper by the Rev. R. L. King, "On the Pselaphidæ of Australia." This contains a description of a very curious genus, Cyathiger, intermediate between the Clavigerinæ and the rest of the Pselaphidæ. Another paper, by W. MacLeay, Esq., is "On the Scaritidæ of New Holland:" of course many new species are described, and a very useful catalogue is given of all the Australian members of the sub-family, amounting to 102 species. The 4th Part is entirely taken up by the same author, with a paper on "The Genera and Species of Amycteridæ:" of this great and exclusively Australian group there were nearly 200 species in the late Mr. W. Sharp MacLeay's collection alone: 182 species are described, all belonging to the long-scaped portion of the sub-family, the other portion being reserved. The descriptions are very clear, especial attention being paid to the more important and diagnostic characters, so that the determination of species is thereby vastly facilitated.

In the 'Transactions of the Linnean Society' is an article entitled "Descriptions of Fifty-two new Species of Phasmidæ from the collection of Mr. W. Wilson Saunders, with Remarks on the Family, by Henry Walter Bates, Esq." The "remarks" are well worth studying by every naturalist, and deserve to be borne in the minds of those systematists who maintain that all genera should be exactly defined and clearly separable from one another, and who believe that every form, at its original creation, was "endowed with certain features in common with other allied species," and thus received "its generic as well as its specific stamp." The "great apparent diversity in the family" does not amount to more than an irregular homogeneity, and the classification is therefore very difficult: "in the Phasmidæ, as in some other groups, Nature," we are told, "in adapting her species to their conditions of life, has, in the process of variation and adaptation, involved all those parts of structure which usually yield, by their partial constancy, characters for the definition of generic groups." The number of known species now amounts to 540.

In the 'Transactions of the Zoological Society' two or three descriptive papers of new butterflies, by Mr. A. G. Butler, and a "List of Lepidoptera collected in the N.W. Himalayas by Capt. A. M. Lang," by Mr. F. Moore, have been the only ones pertaining to Entomology.

Of Mr. Hewitson's beautiful work, 'Exotic Butterflies,' four Parts (53—56) have been published. Of the same author's 'Illustrations of Diurnal Lepidoptera,' Part II. is devoted to the Lycænidæ, and contains fourteen exquisite plates of those beautiful insects.

The British Museum has also published three Parts of Mr. Walker's Supplement to the 'Catalogue of Lepidoptera-Heterocera.'

Mr. Wollaston has given us a complete *catalogue raisonnée* of the Coleopterous Insects of the Madeiras, Salvages and Canaries, under the title of 'Coleoptera Atlantidum.' As he well observes, "For a certain class of naturalists, islands possess a charm which is peculiarly their own,—each one being in itself a kind of separate, miniature world." I will attempt to give a kind of summary of Mr. Wollaston's remarks from his excellent and exhaustive introduction. The total number of species is 1449; the Madeiras having 661, the Salvages 24, and the Canaries 1007. Only 238 are common to these island groups, of which number 38 have been probably introduced by commerce. Of the 1449 species 1039 are not found in the European region (including North Africa), but of this large number Mr. Wollaston thinks that only about 700 can be called *ultra*-indigenous, or the real autochthones of the soil. It is worthy of remark that there are no Cicindelæ; that of the anthophilous Lamellicorns there are ten in the Canaries and none in Madeira. Pimelia, with twelve species, is also confined to the Canaries; one of these is found at the very top of the "Peak," at an elevation of more than 12,000 feet. The Buprestidæ are represented by a single individual taken at Madeira—Agrilus Darwinii; the Canaries have six: the latter group has also six species of Elateridæ, while none have been found in Madeira, although one species has been detected at Porto Santo. Twenty-two species are wholly or partially blind. The Curculionidæ have not less than 273 representatives, and the Staphylinidæ 204. The Euphorbias, which form so remarkable a feature in the vegetation of Teneriffe, have a fauna of not less than 74 species, and at least 50 of these are confined exclusively to them, by far the largest part being Canarian. They are found under the dead bark, only one—Haltica Paivæ—being known to confine itself to the living foliage. It is to be regretted that this remarkable fauna is slowly dying out, owing to the destruction

constantly going on of these shrubs, partly in order to bring fresh ground into cultivation, while the dead ones are sought for the sake of fuel. In gradually-descending order after the Euphorbias, we have the faunas of the pines, the Spartia, and the Semperviva, all principally Canarian, the last having only five dependent species. Of the 423 genera into which the Coleoptera of these Islands are distributed, not one is characteristic of the African* (or Ethiopian) region, or, as Mr. Wollaston puts it, "a *truly* African element is perhaps scarcely indicated." At the same time the large number of endemic species, as we have seen at least half of the whole number, would scarcely warrant us, as Mr. Wollaston thinks, in referring them to the European (including the Mediterranean) region; but when we consider the great difference, comparatively, that exists between the Madeiras and the Canaries, but which, as Mr. Wollaston himself observes, is no more than what would naturally be looked for at stations distant from each other to an equal extent on a continuous tract, we may, by parity of reasoning, come to the conclusion that these island groups are no further removed from the European fauna than, except as regards the greater distance, they are from one another. Be this as it may, they have no claim to the presence of a satellite fauna like Madagascar or New Zealand, or to constitute an intermediate region like India or the northern part of Mexico.† The question of the origin of species on these islands is but briefly touched upon, but the author evidently inclines to the opinion that they were aboriginally stocked when they were yet a part of a continuous land; and if, as is the opinion of Sir Charles Lyell, they were islands during the miocene era, an enormous period must have elapsed since they were broken up, and detached from the main-land. The influence of physical causes in modifying species must, therefore, either have been exceedingly weak, if, after so long an interval, all that we can trace is "some slight departure from the normal standards;" or, this alteration took place at the commencement of the period when they became islands, and was probably due "to a combination of circumstances and conditions which are altogether unprecedented and exceptional." The latter is Mr. Wollaston's opinion, and as one of the proofs of its correctness he adduces the thick beds of indurated mud and calcareous sand, full of semi-fossilized land-shells (over 100 species), which "display no perceptible

* *I. e.*, Africa *south* of the desert and Upper Cataract.

† I am speaking solely in reference to the Coleoptera. No definite limits as to regions will apply to the various classes or even orders of animals collectively.

difference from their recent homologues," and are in many cases confined to the immediate vicinity of the same areas occupied by their descendants. As there is reason to believe that these beds were formed previous to the dissolution of the intermediate land, an incalculable time must have passed without appreciable change. The whole of Mr. Wollaston's introductory remarks are highly suggestive, and the work itself bears on every page the evidence of the most scrupulous care and research. I am very glad to see that Germar's names, Baris, Sibynia, Magdalis, Hypera, Sitona, &c., so arbitrarily changed by Schönherr, and whose changes have been so blindly adopted by other Entomologists, have been restored by Mr. Wollaston.*

Here I should like to make a few remarks on genera and species, as it is a subject which is likely before long to force itself on our attention more than it has yet done. I think the conviction is gaining ground with all those who are studying species in large numbers, that, except in isolated, or what in the present state of our knowledge appear isolated cases, species have no definite limitation. We have come to that opinion very generally in regard to genera, but in both equal difficulty seems to me to exist, the only difference being that we are apt to fix on the idea of an individual to represent the species, while we are, to a certain extent, distracted by the species which represent the genus; and hence many have come to regard the genus as an artificial creation. But although genera cannot be said to have an *absolute* existence any more than species, and can only be regarded as expressive of an *idea*, yet as such they have a *relative* existence. That it is impossible to limit or define them with the *individual* precision necessary to constitute an absolute fact is no proof that they are artificial; indeed, when we consider how many examples might be brought forward—the majority, perhaps, of large

* Mr. Wollaston has altered the name of his genus Eremotes, because of its being too near Eretmotes: this should, by the same rule, be altered because of Eretmotus. Then is not Syntomocerus, which is proposed to replace the former, much too near Syntaphocerus? What is to become of the author's other genera? Will not Zargus be too near Sargus? or Piotes to Piodes? or Melansis to Melasis? or Somatium to Stromatium? or Xenoscelis to Stenoscelis? and so on. Whilst on the subject of generic names, may I be permitted to point out that the use of the letter *k* instead of *c*, for the Greek κ, is contrary to the Latin rule, and a very objectionable innovation? I am glad to see that certain German and French authors have restored the purity of some names thus disfigured, *e.g.*, Acis for Akis, Acimerus for Akimerus, Œceticus for Oiketicus, &c.

groups—in which the genus is obvious, but the species are all but indeterminable, we might be almost tempted to agree with De Candolle, that genera are more natural than species. Another fallacy seems to me to lie in the notion that genera, if weakly characterized, are *necessarily* of doubtful value. As we find species extremely closely allied, although certainly *conventionally* distinct, so may we expect to find genera; indeed, to those who adopt the derivative hypothesis of the origin of species, no other conclusion would be possible. It is partly owing to this view of the arbitrary nature of genera that some naturalists, not Entomologists only, seem inclined to treat the generic idea as comparatively unimportant, or who look on their multiplication as unnecessary. Now, when we recollect that at least 500 genera are annually added to our lists, it is worth considering more closely on what principles they should be based. Is a genus to be limited to a homogeneous group of species? or is it to depend on a rigorous set of technical characters? For, although there may be a kind of *via media*, it is really one or the other that must be adopted. To a certain extent it may be held that the two are correlative, but this is perhaps rather the exception than the rule; and the characters will be secondary, of varying degrees of amount, a little more or a little less, and very difficult, if not impossible, to convey clearly in description; or, if we rely on decisive technical peculiarities, it will in many cases lead to the assembling together of species into genera that would go far to destroy our notions of genera altogether. Practically nothing could be worse than to thrust *quasi*-aberrant species into otherwise well-marked genera, where no one would think of seeking them. It is decidedly an advantage that one species should give us a good idea of those associated with it, but that cannot be done if the number of genera is to depend on the principle of adaptation to the capacities or the memories of those who, in trying to grasp everything, tell us that the difficulty and labour "threaten to overwhelm them." So will the ever-increasing number of new species, if the inquirer will not satisfy himself with going thoroughly into one or two groups only. One thing, however, is quite certain, that if the genera of extra-European insects are to keep pace with the genera of European, then we have not at present half the number that will be requisite. I am far from thinking that every genus proposed is necessary; on the contrary, I regret the tendency of those who, confining their attention solely to local faunas, too frequently exaggerate the importance of scarcely appreciable minutiæ. Such genera are,

however, rarely adopted. If time had permitted I should have liked also to say a few words on the want of accord in classification: why should the *section* of one be the *family* of another, or the *tribe* of a third? why should one group be called Carabici, and other groups, of corresponding rank, Scaphidilia, or Silphales, or Ptiniores, and so on? when a uniform termination would at once give us the key to their correlatives, and a certainty in their meaning that we do not now possess.

It is scarcely necessary for me to say anything of our Natural History periodicals. They are all well known, and the exclusively entomological are indispensable to your pursuit. The 'Zoologist,' after reaching to nearly 10,000 pages, has commenced a new series; while the 'Natural History Review,' a high-class biological quarterly, has come to an unexpected end. The 'Entomologist's Annual' appears to be richer than usual in the number of species added to the British lists. Of our own 'Transactions' I shall only allude to Mr. McLachlan's excellent "Monograph of the British Caddis-flies," which I hope will be followed by others of our more neglected groups.

Of foreign publications the most important is the seventh volume of Prof. Lacordaire's 'Genera des Coléoptères.' This, the greatest entomological work that has ever appeared, is without parallel in zoological literature: it stands in the same rank as Endlicher's 'Genera Plantarum,' or the 'Genera Plantarum' of Bentham and Hooker in Botany. The present volume concludes the Curculionidæ and families allied to them. I quite agree with the author in considering Cossonus and Calandra as belonging to the Curculionidæ, and no more to be separated from them than Brachycerus or Apion. It is not so satisfactory to see the Scolytidæ placed among the Rhynchophorous groups; with Dr. Gerstaecker and M. Jekel, I should prefer to see them excluded.

The parts of the 'Genera des Coléoptères d'Europe' published during the year relate exclusively to the Longicorns, which are divided into thirty-six "groupes," and include several new genera, some of which affect the nomenclature of our British species. This magnificent work is now continued by M. Léon Fairmaire.

The 'Systema Cerambycidarum' of M. James Thomson is an indispensable work to all students of the Longicorns, but its usefulness is considerably marred by the intricacy of the classification.

'Hemiptera Africana descripsit Carolus Stål' is a purely descriptive work.

The seventh volume of 'Skandinaviens Coleoptera' by C. G. Thomson brings us down to the Scolytidæ: we must all regret that so much of this excellent work as is written in Swedish should be lost to us by the use of that language.

M. Snellen van Vollenhoven's 'Nederlandsche Insecten,' a continuation of Sepp's well-known work, has reached the second volume: eight livraisons have appeared during the year.

M. Henri Deyrolle's 'Description des Buprestides de la Malaisie recueillis par M. Wallace' is a handsome volume, enumerating and describing not less than 355 species of this family. Many of the larger genera and some of the sub-families are preceded by analytical tables, which considerably facilitate their examination. Most of the new genera are founded on characters which are not generally admitted to have any beyond a specific or sectional value; nevertheless they appear to form good groups.

In foreign periodicals for 1865 the following are amongst the more important and systematic papers:—

In the 'Bulletin de la Société Impériale des Naturalistes de Moscou:'—

Radochkoffsky (Octave), "Les Mutilles Russes," with 3 coloured plates. Thirty-six species are described and figured.

Motschulsky (Victor), "Un Genre nouveau de Staphylinides." (Renardia,* near Boreaphilus, from New York). The same author has numerous descriptions of Carabidæ collected by himself in his travels.

Solsky (S.), "Descriptions de quelques nouvelles espèces de Staphylinides," pp. 433—451.

In the "Mémoires de l'Académie de St. Petersbourg," Tome viii. No. 1:—

Bremer (Otto), "Lepidoptera Oest-Sibiriens, insbesondere des Amur-landes," a convenient digest, illustrated by 8 well-executed coloured plates.

In the 'Tijdschrift voor Entomologie:'—

Van Vollenhoven (S. C. Snellen); descriptions of species of Buprestidæ, Scutelleridæ and Achetidæ; one of each.

In the 'Mémoires de la Société de Physique et d'Histoire Naturelle de Genève:'—

Humbert (A.), "Myriapodes de Ceylon," pp. 1—62 and 5 plates (4to).

* Has this insect anything to do with the Staphylinidæ?

In the 'Stettiner Entomologische Zeitung:'—

Dohrn (Dr. H.), "Versuch einer Monographie der Dermapteren," continuation; numerous new species.

Burmeister (Prof. H.), "Longicornia Argentina." Eighty-one species are enumerated, several new; the diagnoses are in Latin.

Hagen (Dr. H.), "Beiträge zur Kenntniss der Phryganiden;" descriptions of several Madeiran Phryganidæ; also an enumeration of the Neuroptera found near Zurich.

In the 'Berliner Entomologische Zeitschrift:'—

Loew (Dr. H.), "Ueber der europäischen Arten der Gattung Geomyza;" a second paper on Opomyza, and a third on Rhicnöessa.

Kirsch (Th.), "Beiträge zur Käferfauna von Bogotà;" descriptions of 141 new species.

In the 'Transactions of the American Philosophical Society' (Philadelphia):—

Wood (H. C., jun., M.D.), "The Myriapoda of North America;" a descriptive list of all the known species of America north of Mexico.

In the 'Annales de la Société Entomologique de France' are numerous papers, principally on European insects, by MM. Boieldieu, F. de Saulcy, Chevrolat, Fairmaire, Signoret, and other well-known writers; but as this work is read by most of you, it is unnecessary to specify the articles.

Of 'L'Abeille,' a cheap and useful publication, six Parts have appeared during the year; four of these are devoted to M. de Marseul's Monograph of Buprestidæ, the other two to short notices, and a Monograph of Gallerucidæ by M. L. de Joannis. Neither of these Monographs is yet finished, and the species included are those only which belong to the European fauna, using that phrase in the physical rather than the geographical sense, since the so-called European region includes Western Asia and Northern Africa.

The last Anniversary Address of the President of the Linnean Society was almost entirely devoted to an account of the Natural-History Transactions and Journals now publishing on the Continent. They are immensely numerous, and are written in fourteen different languages, only one of which—the Hungarian—is without any entomological matter. It will probably be one day a question how far the use of any other language than English, French, German, or Latin, will entitle an author to claim the rights usually accorded to priority

of publication. It is very desirable that those who publish descriptions of new species in provincial towns should take care that they are at once made known in the three or four great centres of Science. The law of priority has its duties as well as its rights, and it will be very reluctantly admitted that a name, published in any widely-circulated or well-known work, should be superseded by an earlier publication in some obscure local journal.

The following I owe to the kindness of Mr. F. Smith :—"The British Museum has added 4659 specimens to the Entomological Collections, of which 3597 were presented, chiefly by Mr. W. Wilson Saunders. The most valuable donation consisted of 3207 specimens of Hemiptera, among which is a fine series of the species collected by Mr. Wallace in the Eastern Archipelago. Among the purchases may be mentioned a collection of larvæ of Coleopterous insects, which are to be figured and described in the Ann. Soc. Ent. de France. We may also mention a purchase of 448 species of Chilian Coleoptera from Dr. Germain's collection, and of 180 species of Coleoptera from Russia and Siberia." What will probably give Entomologists the greatest satisfaction is the acquisition of 343 species of Coleoptera *named* by Dr. Leconte.

In vacating this chair, may I venture to hope that my performance of its duties has justified your selection of me for that position ? The honour was unsought and unexpected, and will always remain a source of the deepest satisfaction. In tendering you my most hearty and grateful thanks for your support, I rejoice that in the person of my distinguished successor you have chosen one who cannot fail to increase the interest and efficiency of the Society.

A vote of thanks to Mr. Pascoe for his conduct in the chair was carried by acclamation, and he was requested to allow his Address to be published in the Journal of Proceedings. The vote was appropriately acknowledged, and the request acceded to.

A vote of thanks to the other Officers for 1865 was also carried, and acknowledged by Mr. S. Stevens and Mr. Dunning.

Abstract of the Treasurer's Accounts for 1865.

RECEIPTS.

	£	s.	d.
By Balance in hand January 1st, 1865	7	4	5
Arrears of Subscriptions	16	16	0
Subscriptions for 1865 (133)...	139	13	0
Admission Fees (31)	65	2	0
Compositions (2)	31	10	0
Tea Subscriptions	9	1	0
Sale of Transactions at Rooms £50 0 6			
„ at Longmans' 26 1 4			
	76	1	10
Dividend on £109 14*s.* 9*d.* Consols	3	5	10
	£348	14	1

PAYMENTS.

	£	s.	d.
To paid arrears for 1864:—Rent to Christmas £11 5 0			
Williams & Norgate ... 2 10 0			
	13	15	0
Fire Insurance to Lady-day, 1866	1	13	0
Librarian	18	4	0
Tea, &c., thirteen Meetings	13	13	0
Attendance, Coals, Christmas-boxes, Collector's Commission, &c.	3	7	1
Postage, Parcels, Stationery, &c.	12	13	2
Printing 'Transactions,' 5 Parts	150	8	0
„ 'Proceedings,' Circulars, &c.	14	12	9
Plates for 'Transactions,' Engraving, Printing and Colouring ...	65	6	6
Bookbinding	9	11	9
Rent, 3 quarters, to Michaelmas	33	15	0
Balance in hand	11	14	10
	£348	14	1

Liabilities and Assets of the Society.

Liabilities.

	£	s.	d.
Rent to Christmas	11	5	0
Loan from Mr. Dunning ...	45	0	0
	£56	5	0

Assets.

	£	s.	d.
Arrears of Subscriptions:—good,—(say)	23	2	0
Ditto, doubtful, £39 18*s.* 0*d.*			
Cash balance in hand	11	14	10
Consols, £109 14*s.* 9*d.* (say)	100	0	0
	£134	16	10
Less amount of Liabilities	56	5	0
Balance	£78	11	10

GENERAL INDEX.

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The Arabic figures refer to the pages of the Transactions; the Roman Numerals to the pages of the Journal of Proceedings.

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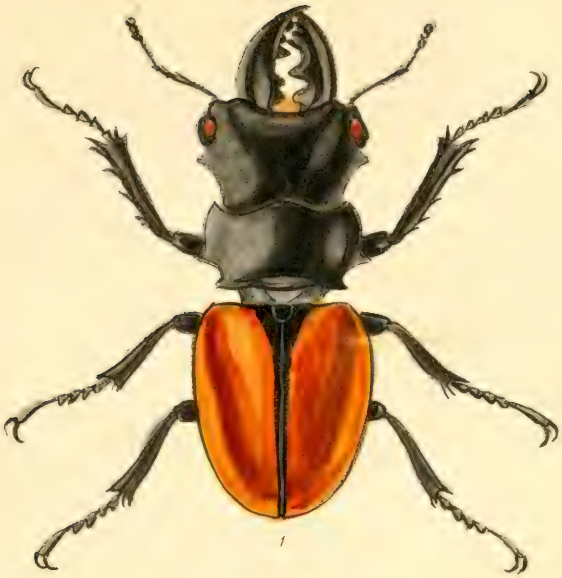

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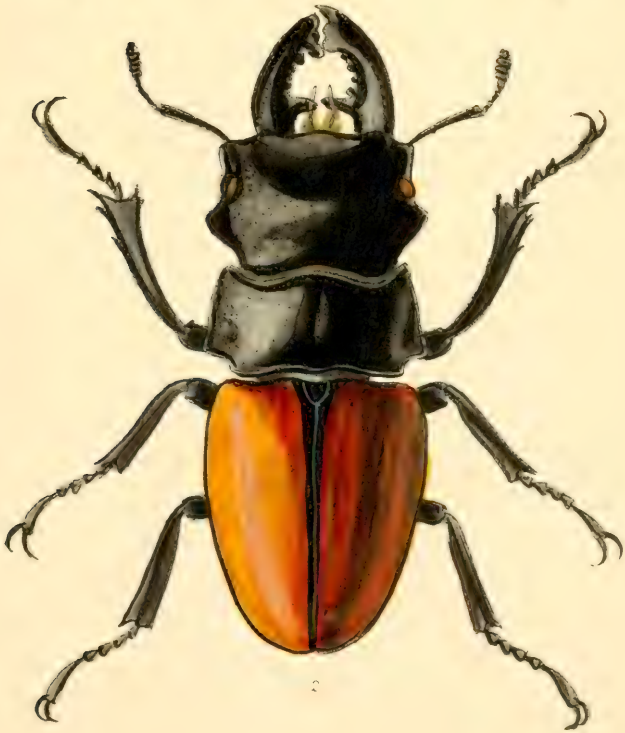

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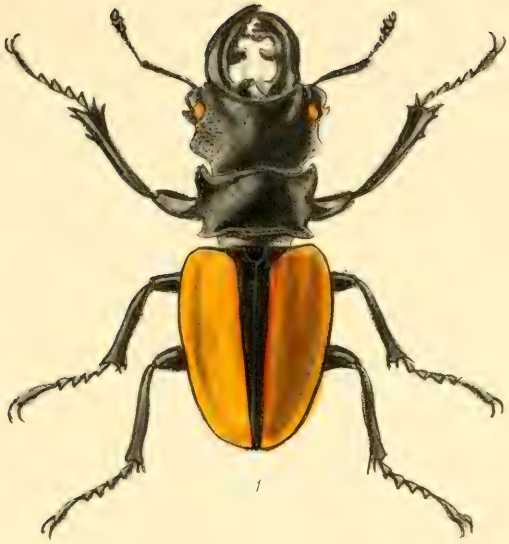

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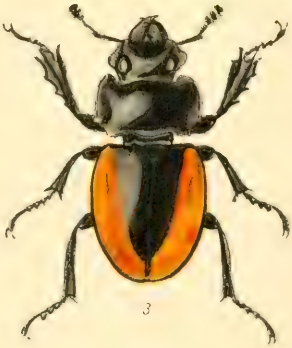

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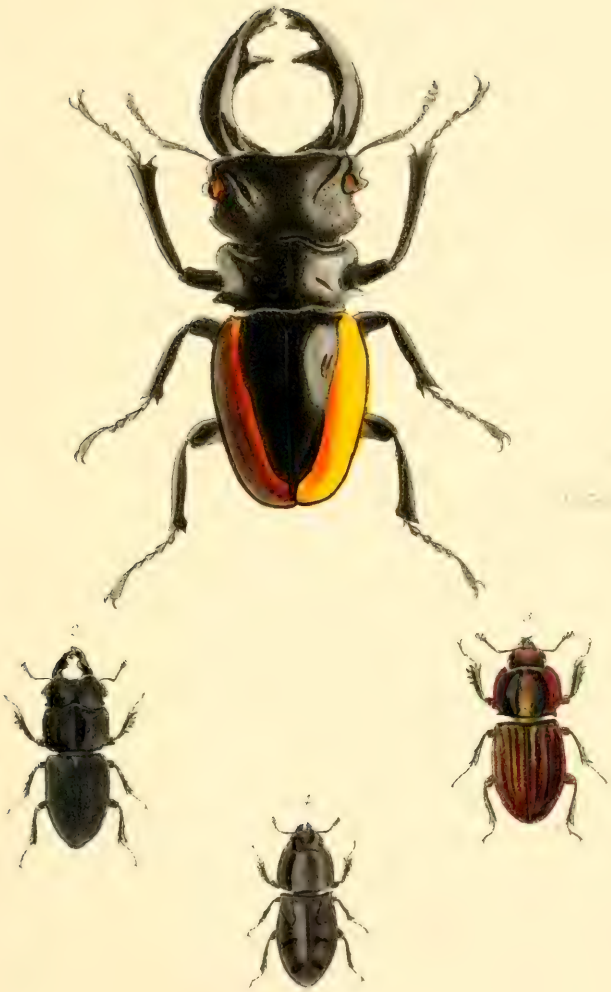

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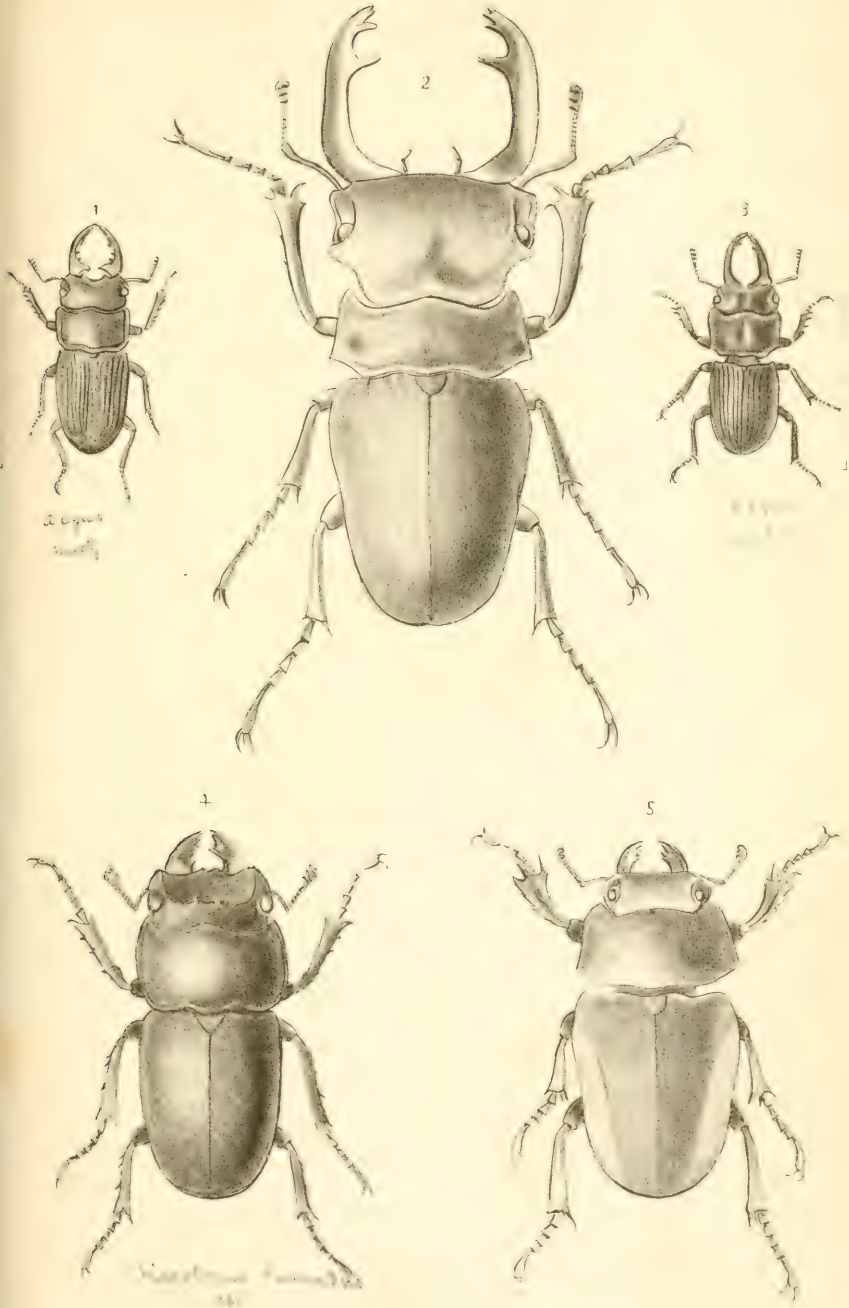

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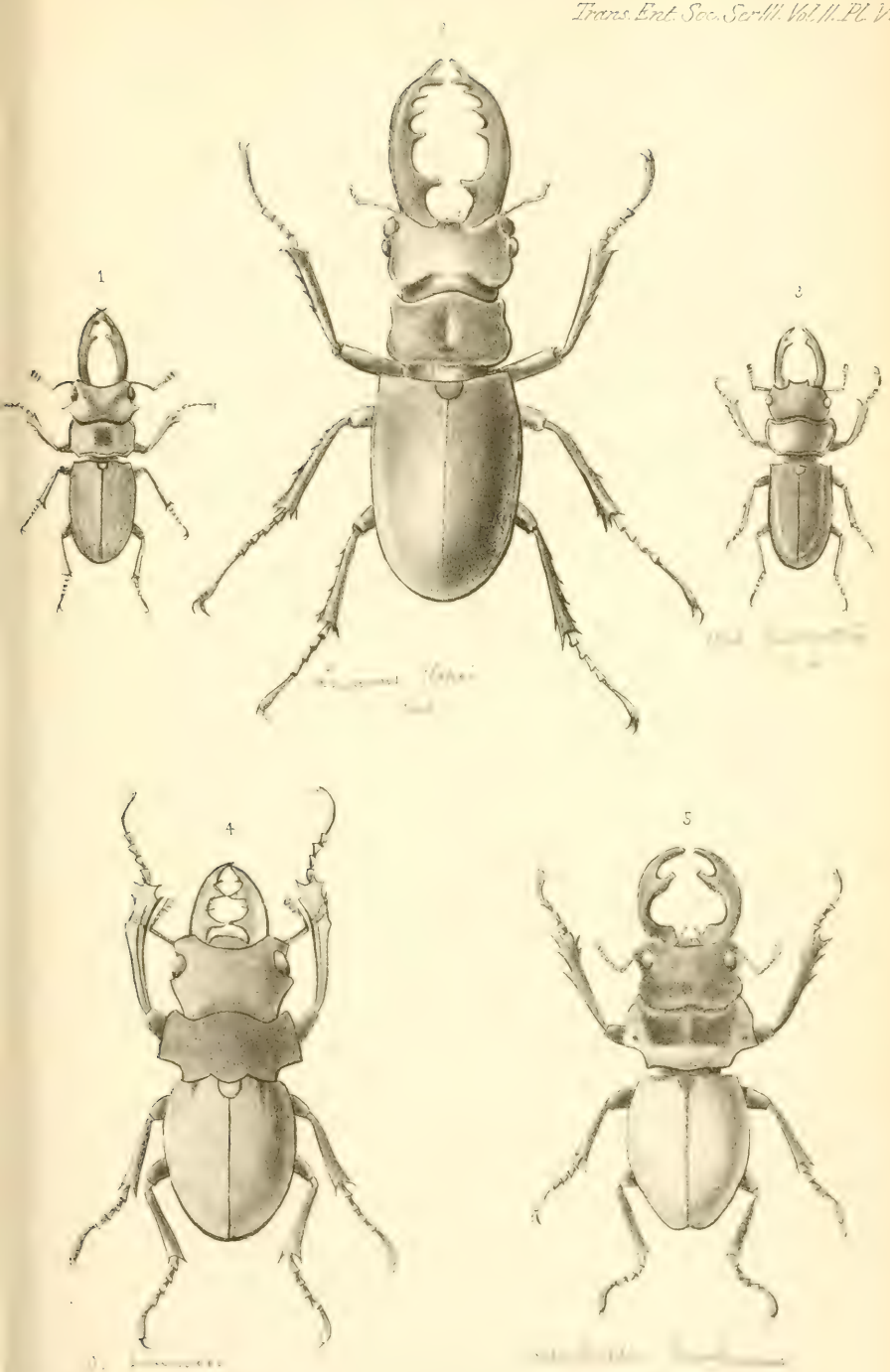

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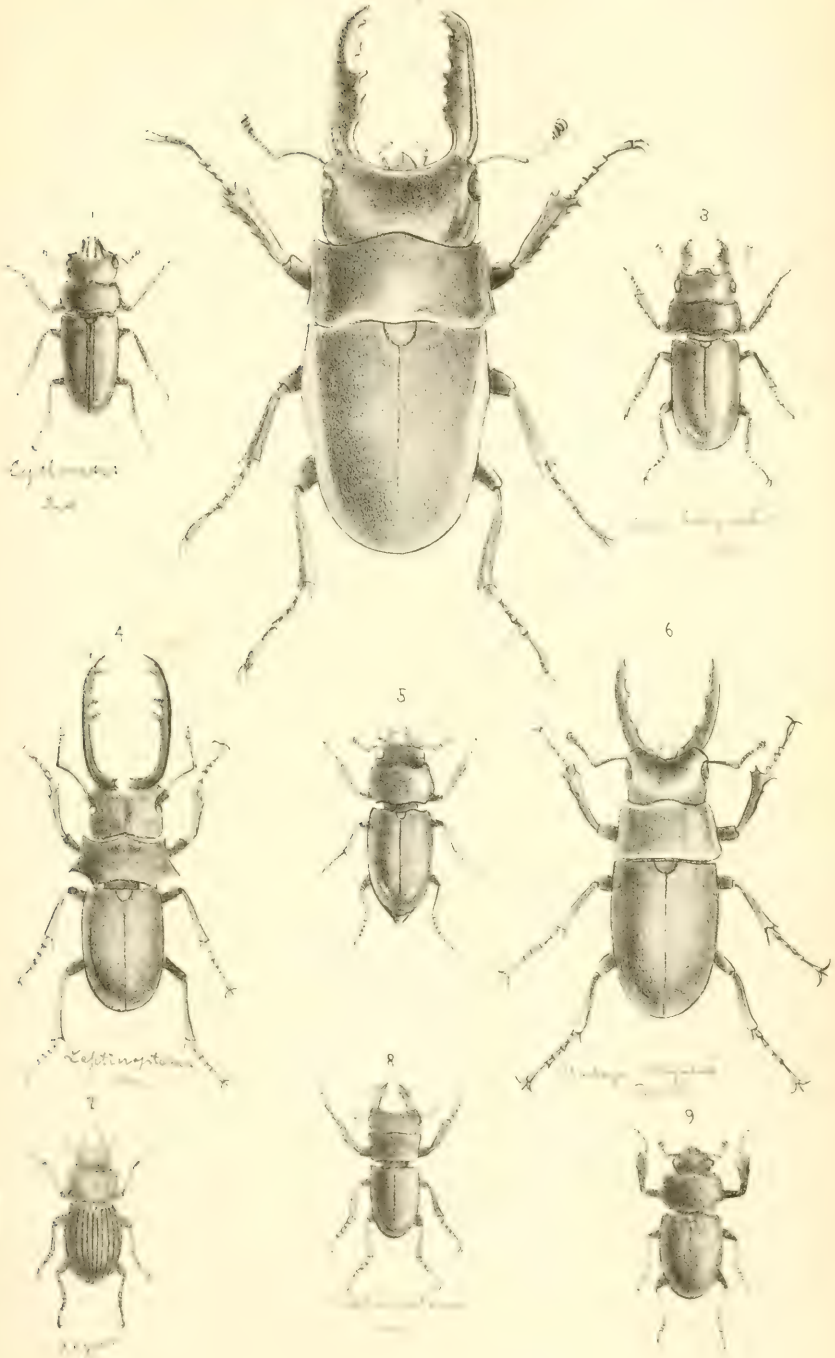

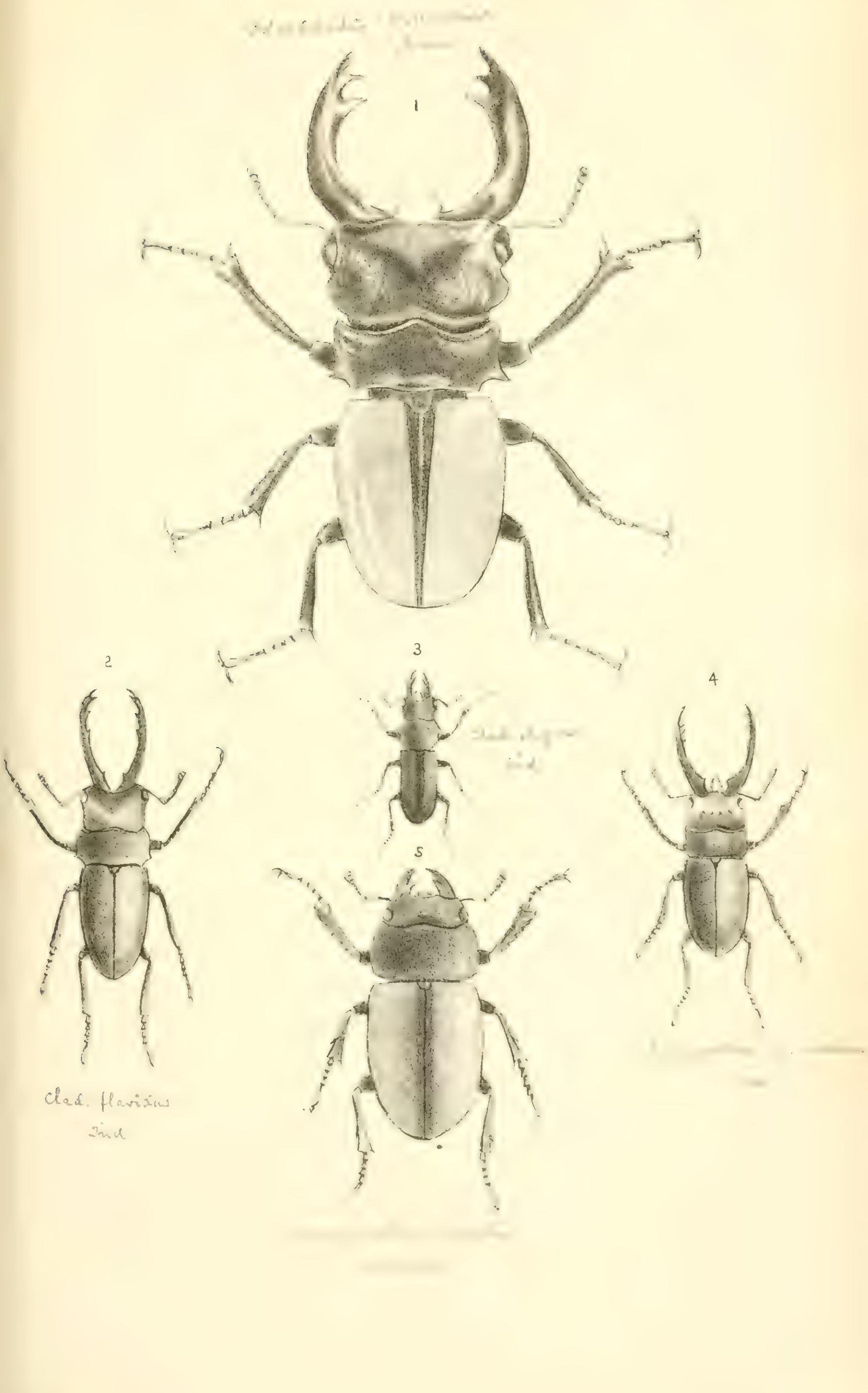
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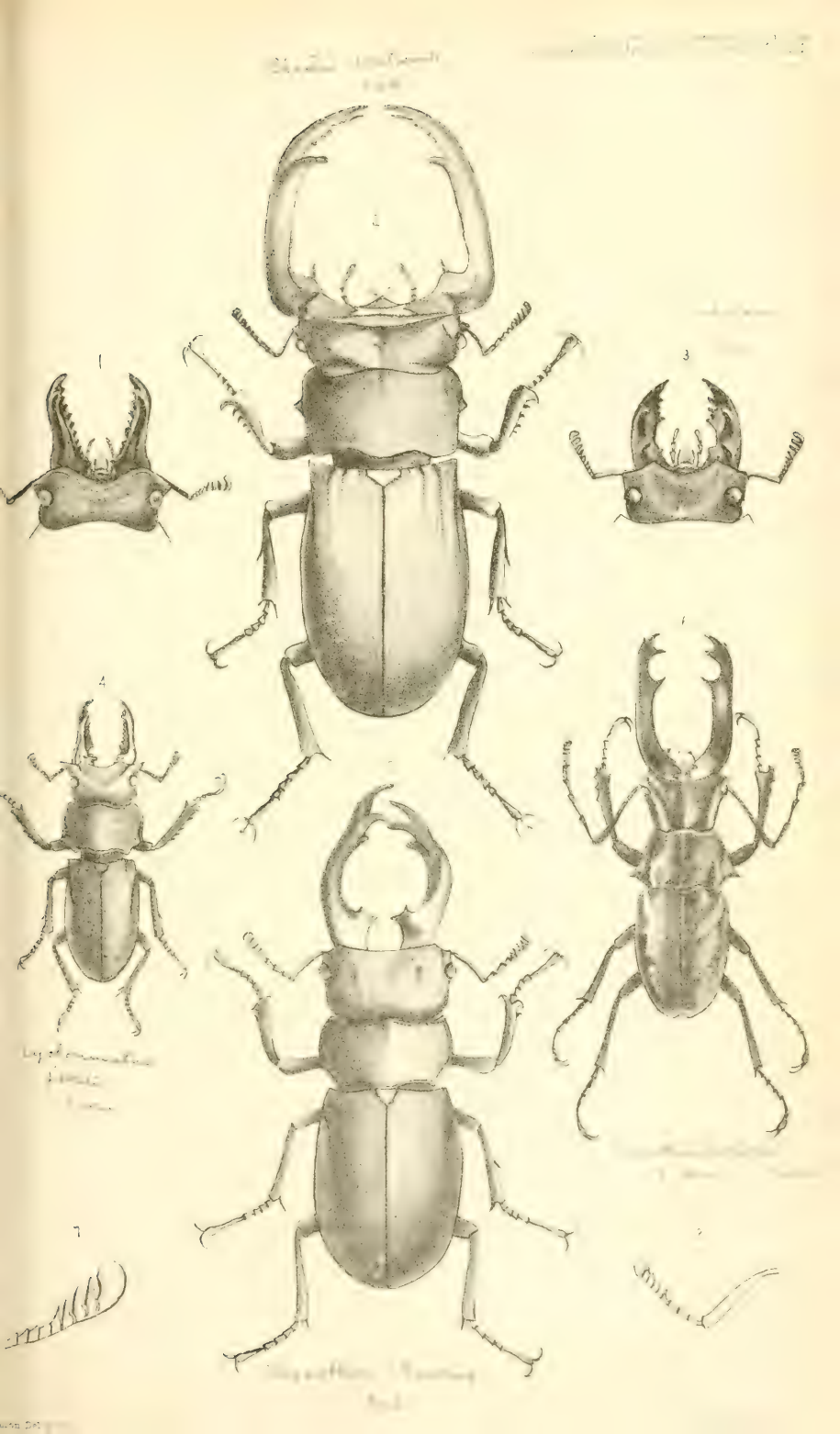

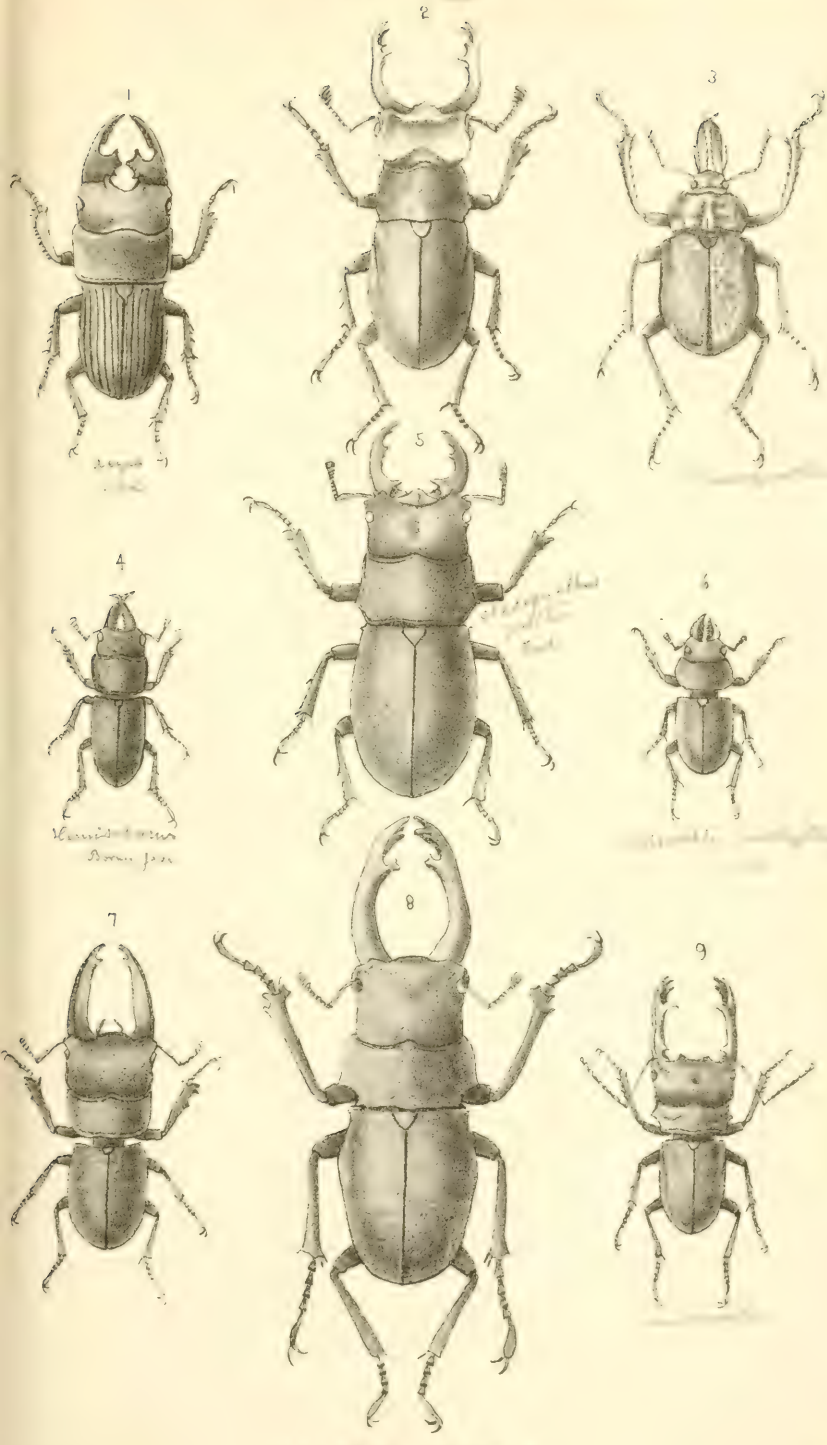
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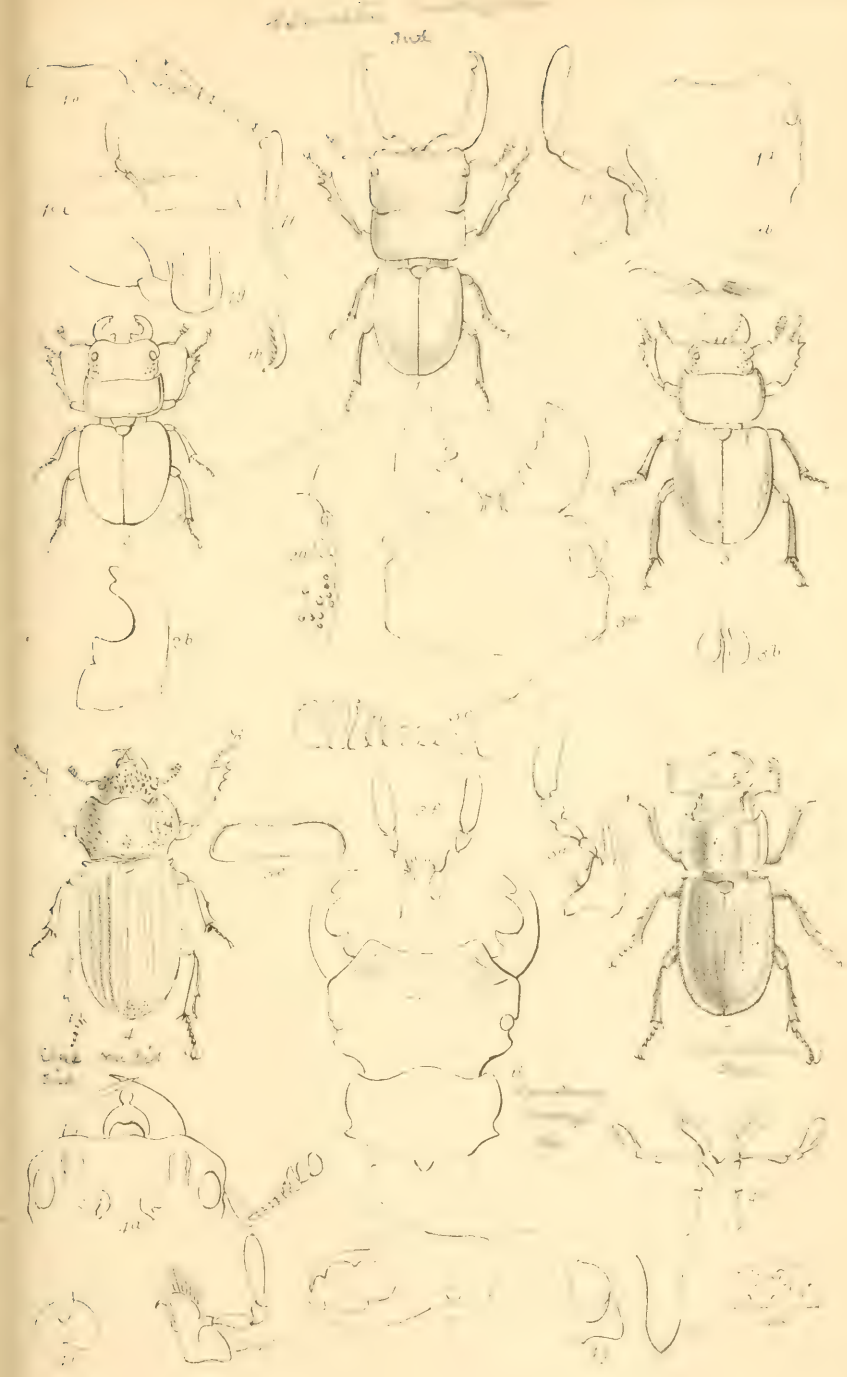

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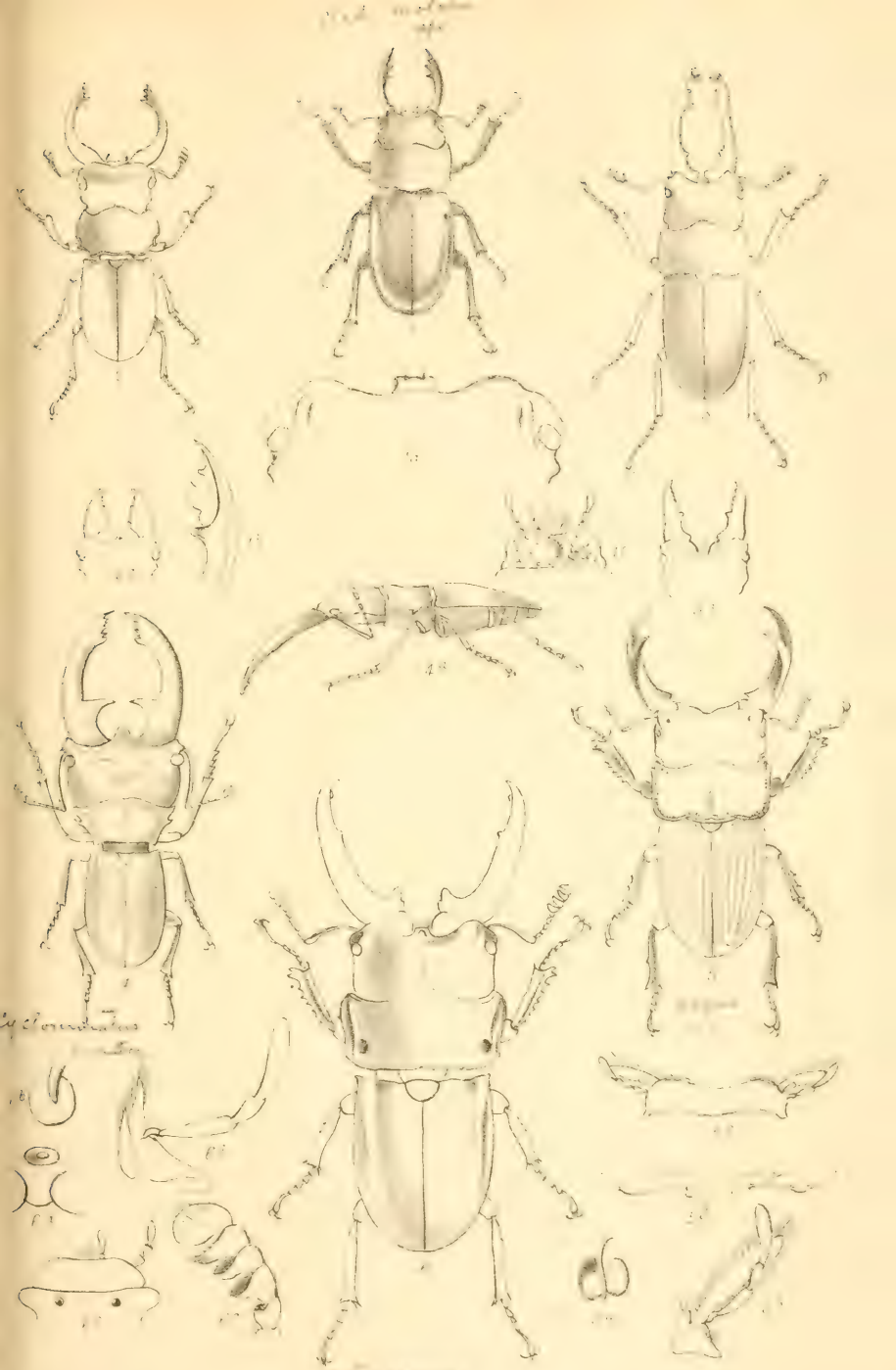

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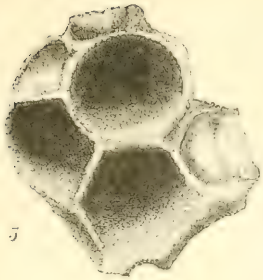

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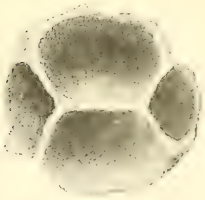

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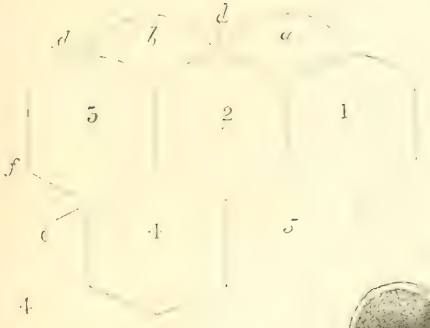

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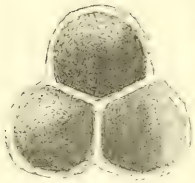

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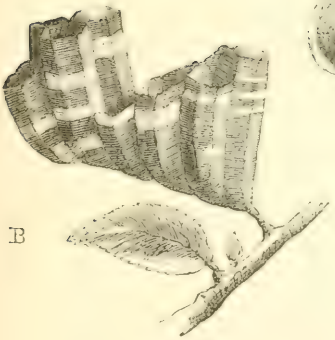

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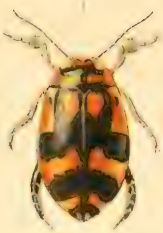

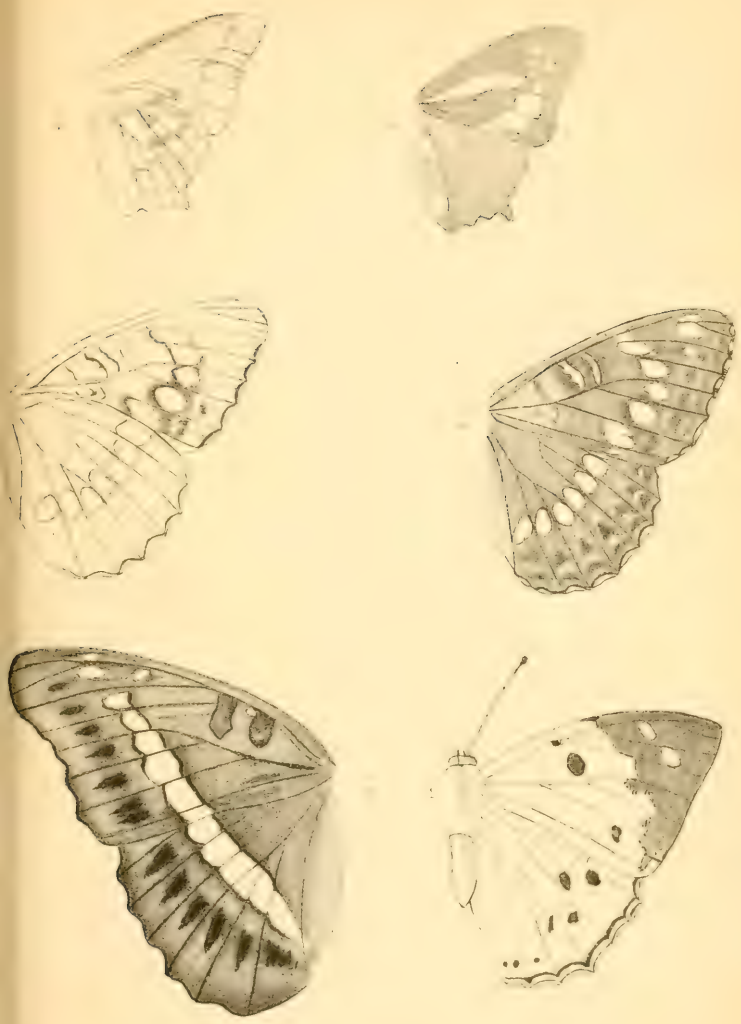

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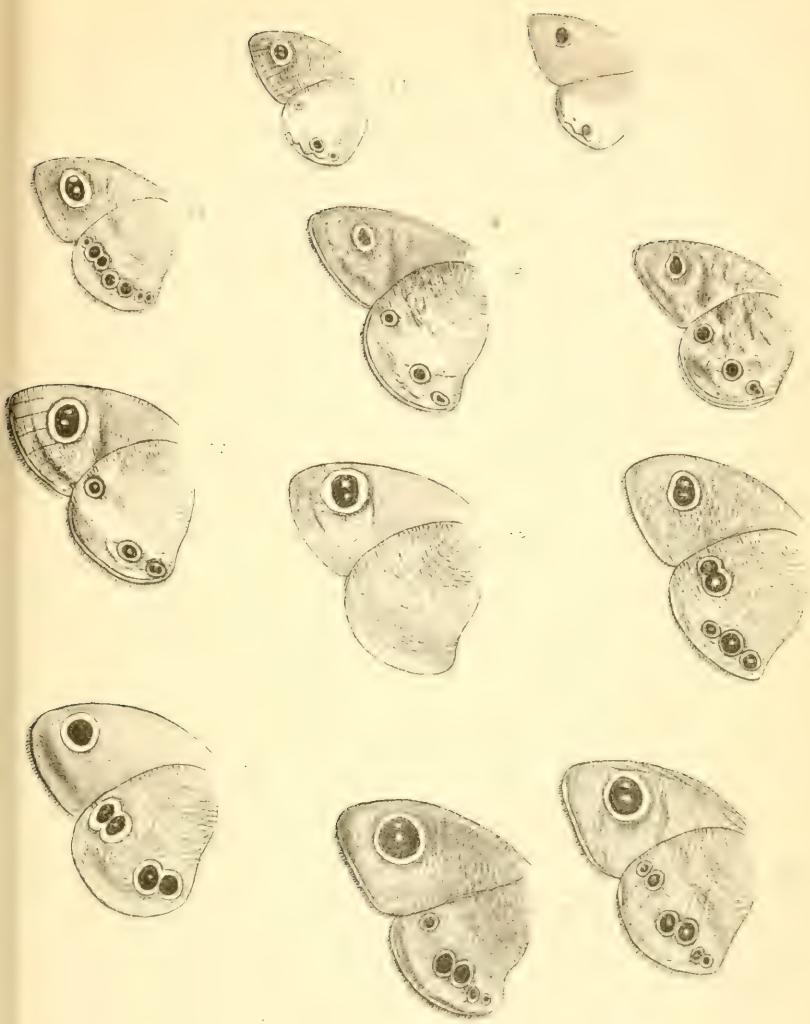

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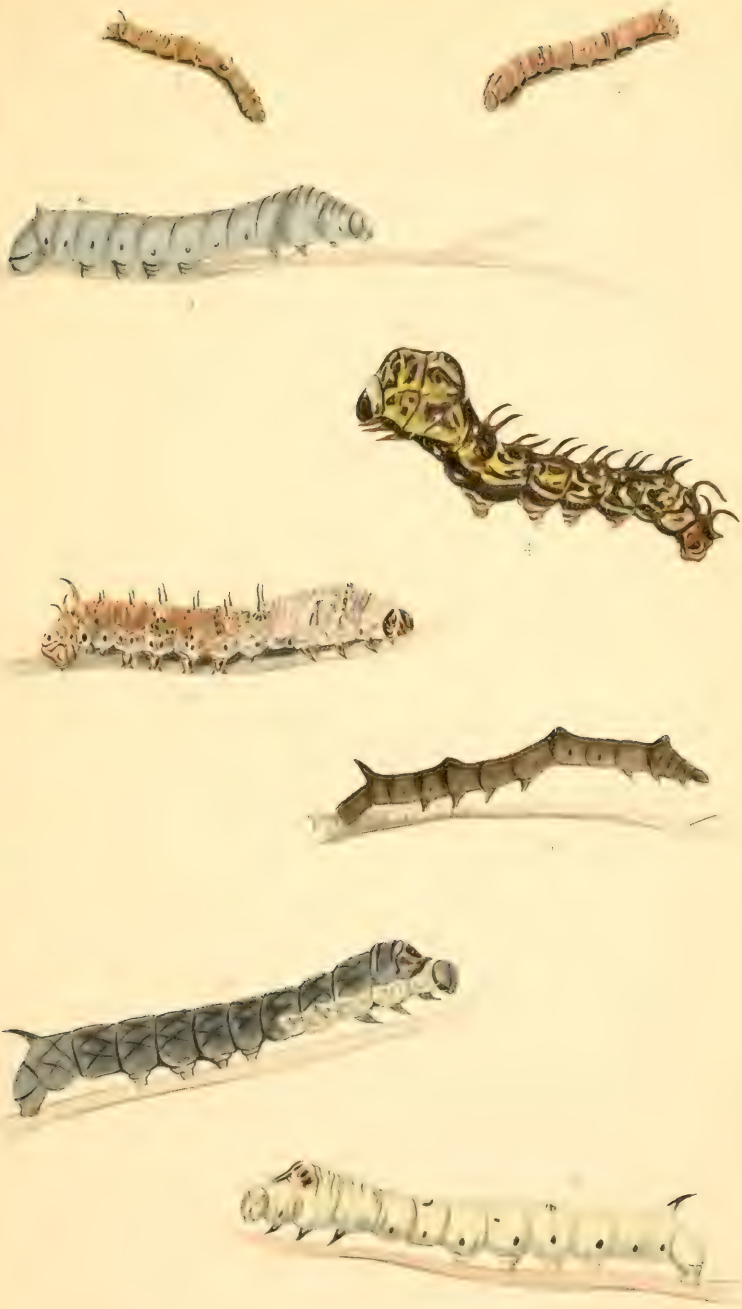

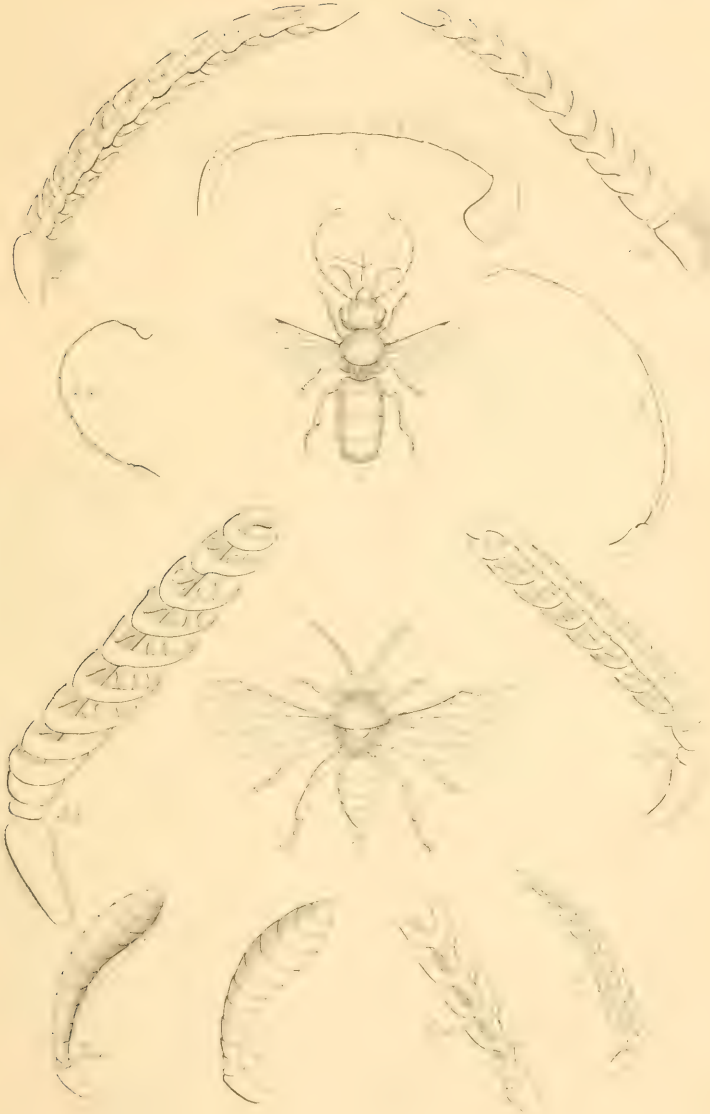

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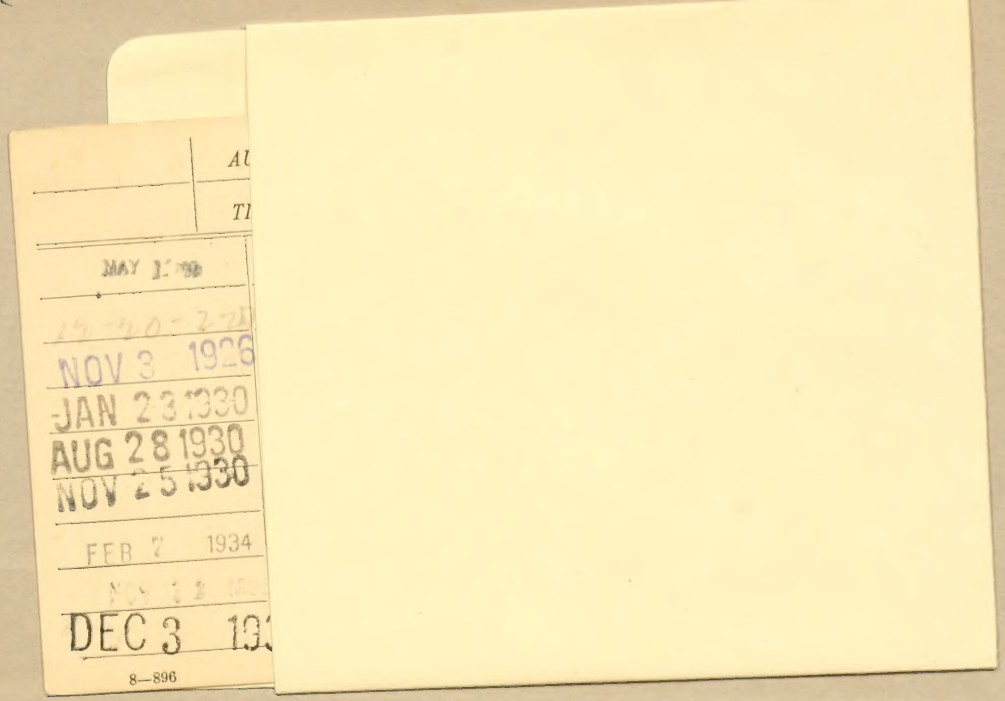
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